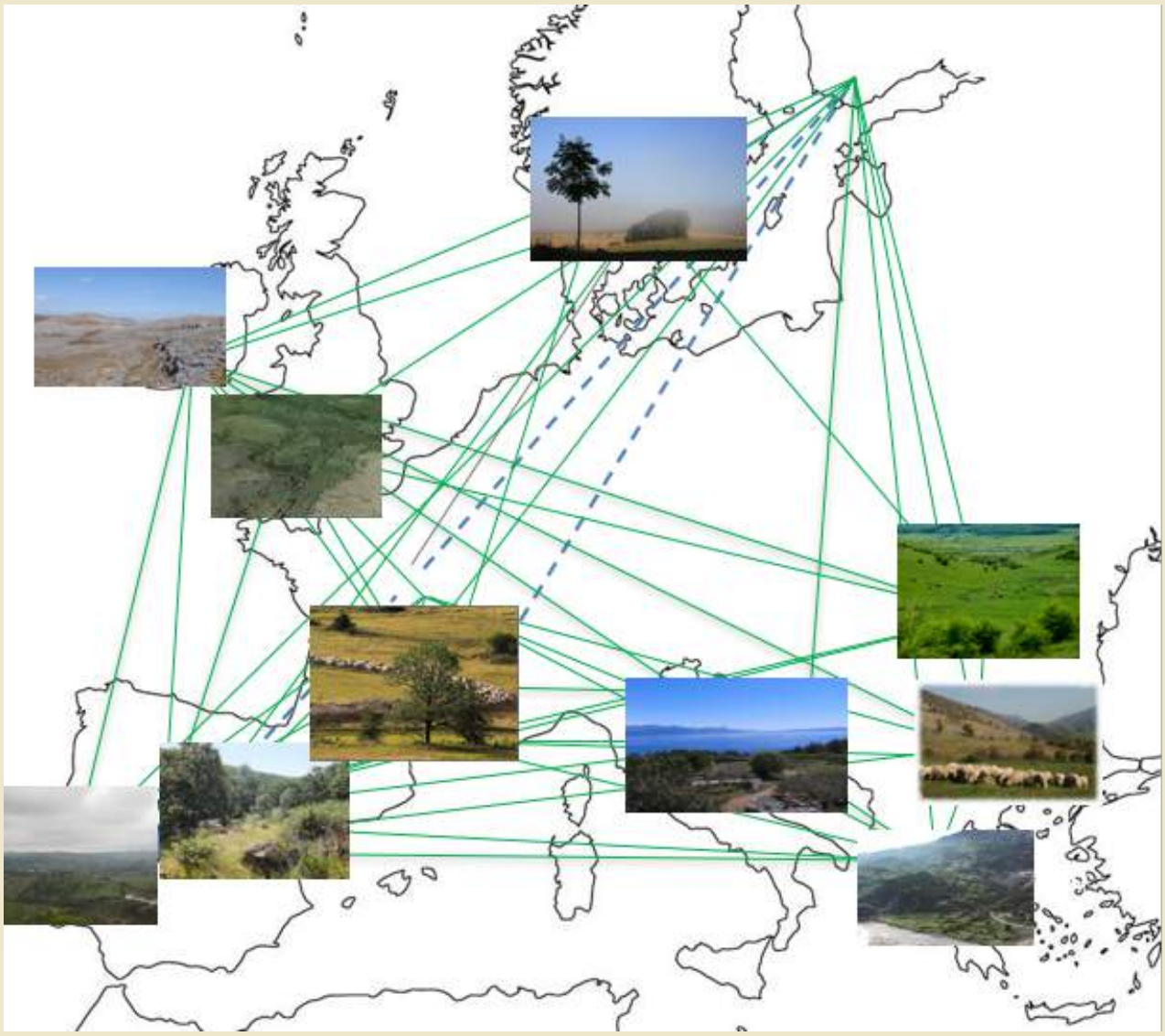
A thematic network on High Value Farming
Learning, INnovation & Knowledge



THE TEN BASELINE ASSESSMENTS
Deliverable D 1.3

Coordination: Xavier Poux, Claire Bernard, François Lerin
Date: July 2017

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HNV LINK - WP1
BASELINE ASSESSMENTS
DELIVERABLE 1.3

Accompanying note

The baseline assessments

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1 FOREWORDS

This note is accompanying the delivery of the 10 baseline assessments due as Deliverable 1.3 in HNV-Link project. It explains the rationale and approach for the baseline assessments, as they altogether represent a consistent material that needs further explanation.

2 THE SPATIAL DIMENSION OF HIGH NATURE VALUE FARMING

High nature value farmland designates "*those areas in Europe where agriculture is a major land use and where that agriculture supports, or is associated with, either a high species and habitat diversity or the presence of species of European conservation concern, or both*". They are an important component of European agriculture, notably in terms of biodiversity, cultural landscape, territorial cohesion, quality products and employment. However, abandonment, degradation, economic and social marginalisation are long-standing challenges for these systems which are still under considerable pressure. For these systems, both for national and local authorities, but also for the European Union and the Common Agricultural Policy, the challenge is twofold:

- to avoid further degradation and disappearance of HNV farming: this could be done by collating, evaluating and disseminating innovations as tools for their development;

- to maintain their "natural value" – in other words the environmental services they provide to the society.[1]

The concept of HNV farming is complex. It conceptually links farming systems and nature value in a holistic apprehension, crossing production-economy, environment and territories. Thus capturing the spatial and territorial dimension of HNV is inherent to any preliminary approach of any action envisaged to conserve HNV farming systems. The issue is not only to conserve farming systems in themselves or natural area in themselves but the two altogether. This conservation approach brings to the need to apprehend the development of farming systems in a multiscalar approach.

This necessity to bridge the two dimensions makes the very sense of HNV Link, with the idea of HNV innovation understood in a broad territorial, market and institutional perspectives.

Box 1 : approaches of HNV innovation (from WP1 Concept note-June 2016)

Innovation is bringing something new in a given context, through a dedicated process (innovation does not occur spontaneously, it needs arrangements and actors to happen) (Klerkx, Aarts, & Leeuwis, 2010).

HNV Link is about specific innovations: those that are able to conserve landscape features of natural value. We call them "HNV innovations" in order to distinguish them from other "regular innovations" that only are about economy or efficient resource management, regardless of biodiversity conservation.

[1] These introductory paragraphs are taken out from HNV Link proposal.

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3 HNV-LINK: USING BASELINE ASSESSMENTS FOR ENGAGING ACTORS FOR HNV INNOVATION PROJECTS AT DIFFERENT SCALES

Here we should recall a starting point of HNV-Link: successful projects for HNV farming are not numerous in Europe. After a comprehensive review in selected countries, project on Result-Based Agri-Environment payment scheme (RBAPS) identified around 20 schemes that could be considered as delivering for biodiversity[2]. Without pretending that all projects are covered in the study, the overall number of projects (a tens) reveal their rarity. In short: HNV-Link addresses a difficult matter and needs to fully understand what is at stake for innovation.

Same RBAPS project insists on the importance of setting an initial relevant assessment for founding the scheme. In the HNV-Link perspective, the assessment needs to be holistic, as said above. It also needs to clearly set the challenges to address for innovation.

In many cases, HNV conservation is seen as a sympathetic but lost or useless cause. Stakeholders neglect to engage in HNV conservation because they do not see the issues and/or consider it as negligible compared to productive areas and/or do not identify any means to change anything. There is clearly an issue in justifying and explaining the reasons to engage for HNV conservation. Not only in general terms as stated in the EU biodiversity conservation policies, but to embody the concept in territories. Biodiversity conservation should take place in a wider territorial and economic agenda in order to happen.

To put it in a translation sociology perspective, the preliminary stages for any policy and coordinated action is to convince actors (i) that there is indeed a case (ii) and that that case is worth being considered. Before defining any concrete action, there is a need to raise coordinated intentions to design actions.

This justification, based on a territorial meaning, should be made at different levels:

- Firstly the level of HNV territories in which there is a community susceptible to engage, at first instance the farmers managing this territory – the Learning Areas of HNV-Link represent such territories.
- Upper levels (production basin, region, member state,…) as any local project also engages with dynamics taking place at this level: in order to mobilise RDP funds, to contribute to markets, to contribute to touristic development or to risk management. Actors at this level can be considered as external actors (Piveteau 1995): they actually engage with the territory, but from an outside perspective. For them, the territory is one amongst others they work with or make use by any means (e.g. by buying a cheese producted in the area or when electing the area as a touristic destination or when defending the flora or fauna in the area).

Box 2 : Role of the baseline assessment as stated in the BA methological guide (D1.2.2)

The baseline assessment is a component of an HNV innovation, understood as a process taking place in a given area. It is the basis for the "enrolment" of stakeholders (including farmers) in an HNV

[2] http://ec.europa.eu/environment/nature/rbaps/index_en.htm

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innovation project: the BA justifies why there is an issue in conserving biodiversity in an area that otherwise would lose its value; it also gives the elements on how to address the problem. It is not an academic exercise, but an analysis to be mobilised by the HNV innovation catalysts when interacting with other actors. In this perspective, the BA has three functions: (a) set the problem and making it clear for other actors (b) feed an alternative vision based on HNV conservation (c) propose a strategic analysis on how to initiate an HNV innovation.

4 BASELINE ASSESSMENTS FOR DIFFERENT TARGET GROUPS

This multi-levels perspective brings to different outlooks on the baseline assessments conducted in the learning areas:

- one "outsider" outlook (from actors of upper levels), for which the issue is to position the learning area in a wider context and to make it justifiable for any HNV project. As said above, such actors belong to public or private bodies, in relationship with agricultural and rural development issues, not only with nature conservation issues. For those actors, the issue is (i) to reveal how their field of action is linked to farm development and landscapes, nature and risk management issues (e.g. the way cheese is sold has an impact on fire risks) (ii) to raise interest for engaging (e.g. nature value may also be a market value);
- One "insider" outlook, for which the issue is to give a fine understanding of the dynamic at play and reasons for engaging for HNV in *their* territory. Note that these "outsider"/"insider" outlooks are not one way: it makes sense for an internal actor to step back in order to get a wider picture of his/her area; and it also makes sense for an external actor to get closer to the understanding of a given territory.

As a matter of fact, this justification function of the BA can be considered as the fundamental innovation (in the meaning of "establishing") in an HNV project process. If innovation can be defined as bringing something new in a given context, then bringing a new outlook and a new intention to change the fate of HNV systems is the overarching design innovation.

5 HNV-LINK: EMBEDDING THE BA IN A LOCAL PROCESS WITH A HOLISTIC VIEW

The central device of HNV-Link as a project is a collection of 10 learning areas, in which is experimented the setting of HNV projects (for the great majority of them) or the early implementation of measures (for two of them: Burren and Causses-Cévennes). Having said that, how should one proceed in order to engage with other actors? "One" being the Learning Area coordinators, ambassadors of HNV-Link in each LA.

The completion of one baseline assessment in each learning area has been proposed as a first step for such engagement: firstly to better understand the territory in all its dimensions (environmental, economical, sociological), but mainly to be able to bring a new vision to other actors. Note that the identification of relevant actors to engage with is a key component of the BA. Referring to above, the BA has a primary function to justify a HNV project to local actors.

The collection of BAs should be considered as an original contribution to the understanding of a diversity of HNV areas. Indeed, such inspiring panorama or descriptions pre-existed the BAs

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(http://www.high-nature-value-farming.eu/ or *HNV farming in Europe*). But they did not have this systematic comprehensive approach of the territories (for example in considering the rural and urban context of HNV areas) nor the clear goal to support a BAU scenario against and HNV vision. The assumption is that if one wants to use such baseline assessment for the design and the launch of HNV innovation project, he/she needs to have holistic understanding of his/her project area. As said above, the issue is not only the clear understanding of the relationship between farming systems and biodiversity (which is the key link in HNV analysis), but the wider understanding of the territorial, cultural, market and institutional background of the farming system development. Such an understanding is demanding and mobilises multidisciplinary approaches.

6 HNV-LINK: PROPOSING A METHODOLOGY FOR COMPREHENSIVE BASELINE ASSESSMENTS RESPECTING A GRASSROOT APPROACH

We should thus emphasise that the approach for completing the assessments aimed at finding a balance between a common structured frame – in order to give an holistic method for LA and facilitate further comparison – and a certain flexibility in the way to fill the frame, due to the different human means, data and studies existing in different contexts. Such differences are reflected in the diversity of learning areas: some emphasis on environmental aspects while other are strong in analysing the consequences of rural driving forces. Despite all the efforts spent in the completion of BAs on nearly 9 months (September 2016 to June 2017), there still are gaps, fields of analysis that would require more investigation. The formal aspect of completing such an assessment should also be considered: the primary function of BA is to engage local actors. This means that, except for the UK and Ireland, the original version of BA was in native language and had to be translated into English, for external readers (some parts of the baseline assessments that are needed for external readers are completely obvious for local actors: no need to explain the climatic constraints to a local goat farmer) with different skills in doing so according to the different situations. Similar differences are visible in the display of stats, maps, transects and figures. While a huge effort has been made for collecting or processing the most relevant ones, skills were not equally distributed across LAs. In a way, the formal diversity in the collection of BAs reflects the diversity of actors in different contexts. This is the reality of grassroot initiatives and we can argue that the difficulty in getting the perfect BA (again, this would mean: readable for an English speaking external reader who does not know the LA and who would ideally get the full picture in a very synthetic format) in the frame of HNV-Link is a finding in itself.

This being said, and as evoked above, the precaution of pointing the disparity and weak points of BAs should not downgrade the work undertaken. We do believe that all BA brings relevant information for a holistic understanding of what is at stake in their respective LA. We should here evoke the method undertaken in order to achieve it (designing and carrying on this method was the role of WP1):

- A first short concept note of what is at stake with an HNV innovation project [see Box 1] and survey to LA coordinators for good understanding and amendment. This common sharing of what should be the whole philosophy of an HNV innovation project was thought as a
- The completion of a preliminary methodological guide discussed across the network during the kick-off meeting. This guide consisted in theoretical and methodological considerations and in a detailed case study (the one of Vercors in France) in which an assessment had been conducted for the sake of initiating an HNV project. While the project in itself failed for

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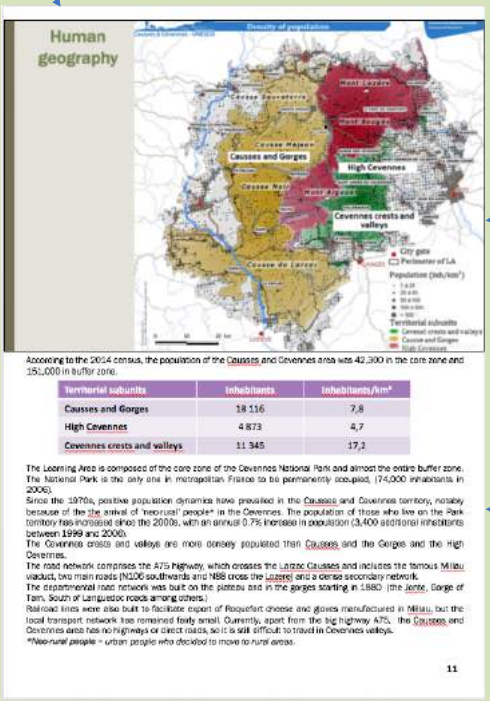
several reasons, it could be argued that the Vercors assessment itself was valid enough to serve as an inspiring and concrete example.

- A final version of the guide had been completed after discussions during the kick-off meeting. The main amendments were about the very practical organisation on the first steps in each LA. The
- An intermediary milestone, on November 2016 was set. The idea was to collect all the material available, covering the different themes forming the baseline assessment (environmental, agricultural, rural, institutional and actors), to gather it in an intermediary working document sent to the WP1 coordinator. On this basis, discussions of around 2 hours between the WP1 coordinators and LA teams had been led in order to clarify some issues, identify the organising points of each BA and the possible difficulties in completing the work.
- A meeting on January between WP1, 2 and 5 coordinators led to the conclusion that providing a very structured common template to follow would help the provision of the BA. This structure is the one used for all BA. A formal innovation was to combine a powerpoint layer (used during the local meeting – though in local languages) with a redacted layer. The intention was double: favour the use of visual and illustrative elements, and optimise the efforts for the completion of the BA, for which a full redacted word report was not obviously the best format.

Box 3 : an example of the page display of the BA – a combination of visually rich information and text

The theme of the page



A visually rich half-top page

An accompanying explanatory text

(Example from Causses et Cévennes BA)

- A preliminary version of each BA, following the above approach, was aimed at one month before the due time for delivery (end of May) in order i) to give time for amendment, ii) all the more to allow a cross-reading across the network. The principle being to "test" the understandability of each BA for an external reader. Each BA was also reviewed by WP1 coordinator in order to get an overall consistence of the task.

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Box 4 : the common structure of the baseline assessments

In order to organize the assessment and facilitate the future comparison, a common structure has been discussed and set for each LA. This consists in:

- "a portrait" of the area, giving the key elements necessary to capture the eco-geographic, administrative, human geography, economic and agricultural dimensions of the area. This is mainly useful for external readers to understand the nature of the area, but this section has also been used in order to justify the boundaries of the LA: what makes this area consistent in terms of project design?
- a time-line, consisting in a time division relevant to explain the development of the area on the past decades up to the present situation. Background historical changes — typically the entrance in the EU for "new" member states — define the milestones. Each period is used to describe the co-evolution of the general background, the rural context, the farming systems and markets and the resulting landscape and biodiversity. This narrative approach is used in order to embed the HNV development in its temporal and spatial frame.
- A scenario section consisting in a business as usual scenario and an alternative HNV vision-scenario. The BAU scenario is used in order the reveal the challenges faced by the LA. The HNV vision is necessary in order to set the objectives in terms of nature and landscape conservation and, when compared with the BAU, in terms of agricultural development and innovations.

The whole collection of BAs results from this demanding process.

7 THE LOCAL ACTORS INVOLVEMENT

Although it is not always visible in the formal delivery of each baseline assessment, it should be emphasised that in most LA, if not all, the baseline assessment has been to opportunity to engage local actors in the very production of its content. In other words, the BA was not only the occasion to bring new information to local actors, but to make them contribute to this production. The ways of generating such local knowledge production have been diverse and depended on each context: it could have consisted in local workshops, focus groups, surveys or more in-depth interviews or even specific studies. But, noticeably, in each case it was the opportunity to share the assessment with involved actors. Another way of making the bottom and grassroot innovation living at the very beginning of the HNV innovation process.

8 THE BASELINE ASSESSMENT AS A REFERENCE FRAME FOR ASSESSING THE RELEVANT INNOVATIONS

Alongside the "enrolment" and justification function, the BA has another key function, which is to assess the innovations as collected in work package 2. The fundamental issue is that the impact of an innovation is highly context dependent, and that there is no innovation which in itself is positive or negative for HNV conservation.

The case of market innovations illustrates this point. In many HNV areas, the lack of economic return for HNV farmers frequently leads to the idea to give an added value to HNV products – typically cheese –, with higher prices paid to farmers. In some cases, this innovation is indeed bringing

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economic sustainability when it is associated with the continuation of the use of extensive pastures. This mainly happens when such pastures are easily accessible and are not proper for any intensification; in this case, the maintenance of farmers, animals and market prospect indeed goes along HNV conservation[3]. But in other cases, higher selling prices may lead to intensification and/or specialisation on selling the product — to the extreme, the farmer may abandon the most difficult grazing area and replace the fodder by bought feed in order to allocate most of his/her time for cheese making for instance. The "image" sold is the one of extensive pastures, the reality is limited use of pastures.

This central example illustrates three key ideas:

- There is a need to properly understand the economic rationale of farming systems through the eyes of spatial and land-use analysis;
- There is a need to assess innovations in a consistent and holistic approach: the example of better-sold cheese shows that the impact of developing a PDO for example will not only depend on the market development but also on other innovations associated with this PDO: organisational devices and/or regulatory innovations *combined* with PDO might entirely change its impact on landscape management;
- There is a need to distinguish between the analysis of agricultural development *in* existing HNV area and *for* HNV area conservation. From a classical (non specific HNV) perspective, developing PDO in extensive areas will always be a positive thing *in* HNV areas as it brings territorial value. But, as said above, HNV innovation eye brings another demand when it comes to the point: under what conditions is this innovation positive *for* HNV conservation?

In this perspective, the BAs are needed to fully understand the context in which a set of innovations is to take place for HNV conservation. In this sense, they are the complement to WP2 dedicated to innovations identification and analysis.

9 THE BASELINE ASSESSMENT AS A FUTURE ELEMENT OF MONITORING AND ENGAGEMENT

At this stage of the process, in each learning area, the baseline assessment has the primary roles of enrolment and innovation assessment stated above. But such assessments can also be put in a longer term perspective, when it comes to assess the project – being a success when its outcome is a strong commitment for HNV farming system conservation (e.g. the case of the Burren in Ireland) or, possibly, a failure when despite efforts, the course of agricultural development is not able to maintain natural value assets. This future perspective brings to a key element of the baseline assessments, being the completion of one "business as usual" scenario against a "HNV vision" scenario.

These scenarios clearly have an enrolment and evaluation dimension:

- The BAU reveals what is the most likely to happen in future; it is here to assess if there is indeed a case for HNV conservation. Typically, when it comes to renew a farmers' generation

[3] Which does not mean that the whole area should be extensive: extensive grazing in summer may require fodder reserves in winter that imply to intensify some meadows – what counts here is the significant presence of extensive areas at landscape level.

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still in place, what will take place? Thus the HNV project has to be assessed against this plausible future, and not the present situation.

- The HNV vision is thought as to bring an alternative, desirable (against the BAU) and feasible scenario. By nature, it has to engage local actors and explicit what is there role in this counter-scenario, in many ways demanding as it is a matter of going against on-going trends.

Having these scenarios in mind will feed the future assessment of the HNV project in each learning area. In 2020, 2025 (…) having such explicit scenarios will provide a reference frame for assessment. The issue will not necessarily to assess whether the BAU or the HNV vision were "right" – the BAU is set in order *not to* happen when it reveals alarming issues ; the HNV vision is too complex to be fully designed from the start — but to retrospectively analyse the trends that took place. Here the baseline assessment and the scenarios will contribute to a frequently missing component of any sound project assessment: the baseline situation and the clear setting of objectives and goals.

It should be added that this assessment dimension of the BA is not only a matter of external and neutral accountability, it is also a continuous process in the course of the local project. Further studies have shown the importance to have a common reference document – diagnostic, clear goals and vision — in order to sustain the social process, after the enthusiasm of the starting phase has gone into action.

10 THE ATLAS PERSPECTIVE

At this stage of HNV-Link (July 2017), the role of this deliverable is to display the richness of the material collected in each learning area.

But it should be here recalled that this abundant material will be treated in a more synthetic and comparative perspective, taking the form of an Atlas (D 1.4.3). This atlas will adopt a "meta" perspective in comparing the common features and differences between learning areas. Its targets will be of three kinds:

- Actors outside the 10 LAs, in different countries, susceptible to engage for HNV conservation at local level. The Atlas will help them to position their own area in a wider picture, in order to reveal what are the structural facts (in the eco-geographic, institutional, farming and rural domains) to be considered in order to engage for HNV innovation projects;
- Actors having an "external" link with LA[4], but not yet directly committed in the local process. For them, the Atlas will help them to better position their LA in a wider EU perspective and, hopefully, bring further justification for action.
- "Internal" actors within each LA: for them, the Atlas will help stepping back and communicate with external actors on appropriate levels of argumentation (which is not always easy when you are engaged at the very local level). The Atlas will also feed the crossed visit process of HNV-Link, in better showing what are the common features between LAs.

Note that some sections of this document will be re-used for the introductory section of the Atlas.

[4] See actors' typology in heading 3 above *HNV-Link: using baseline assessments for engaging actors for HNV innovation projects at different scales.*

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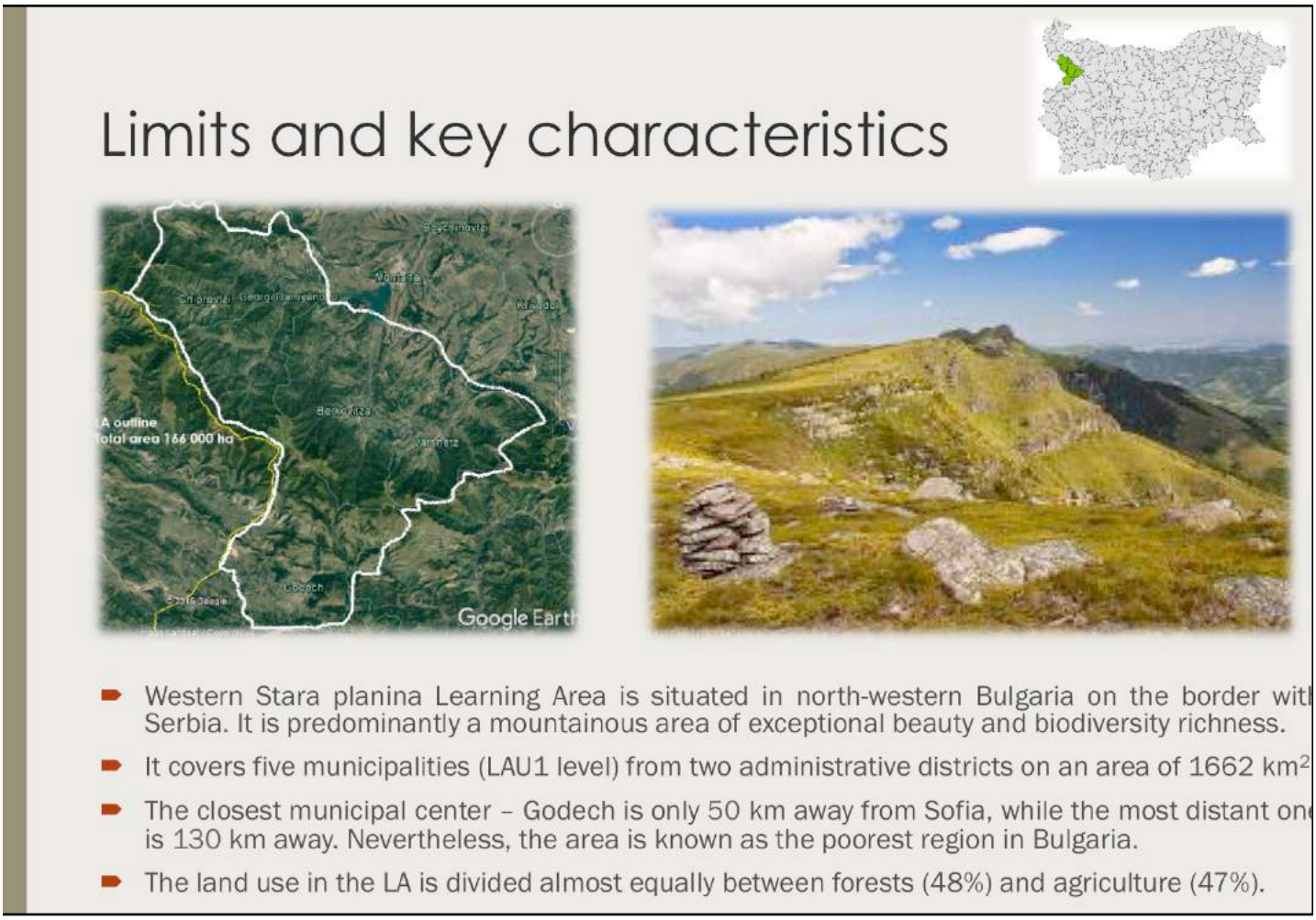
A thematic network on High Value Farming
Learning, INnovation & Knowledge

LEARNING AREA « Western Stara Planina » (Bulgaria)

A BASELINE ASSESSMENT

Authors: Yanka Kazakova, Vyara Stefanova, Maria Yunakova, Mariya Peneva
Date: June 2017

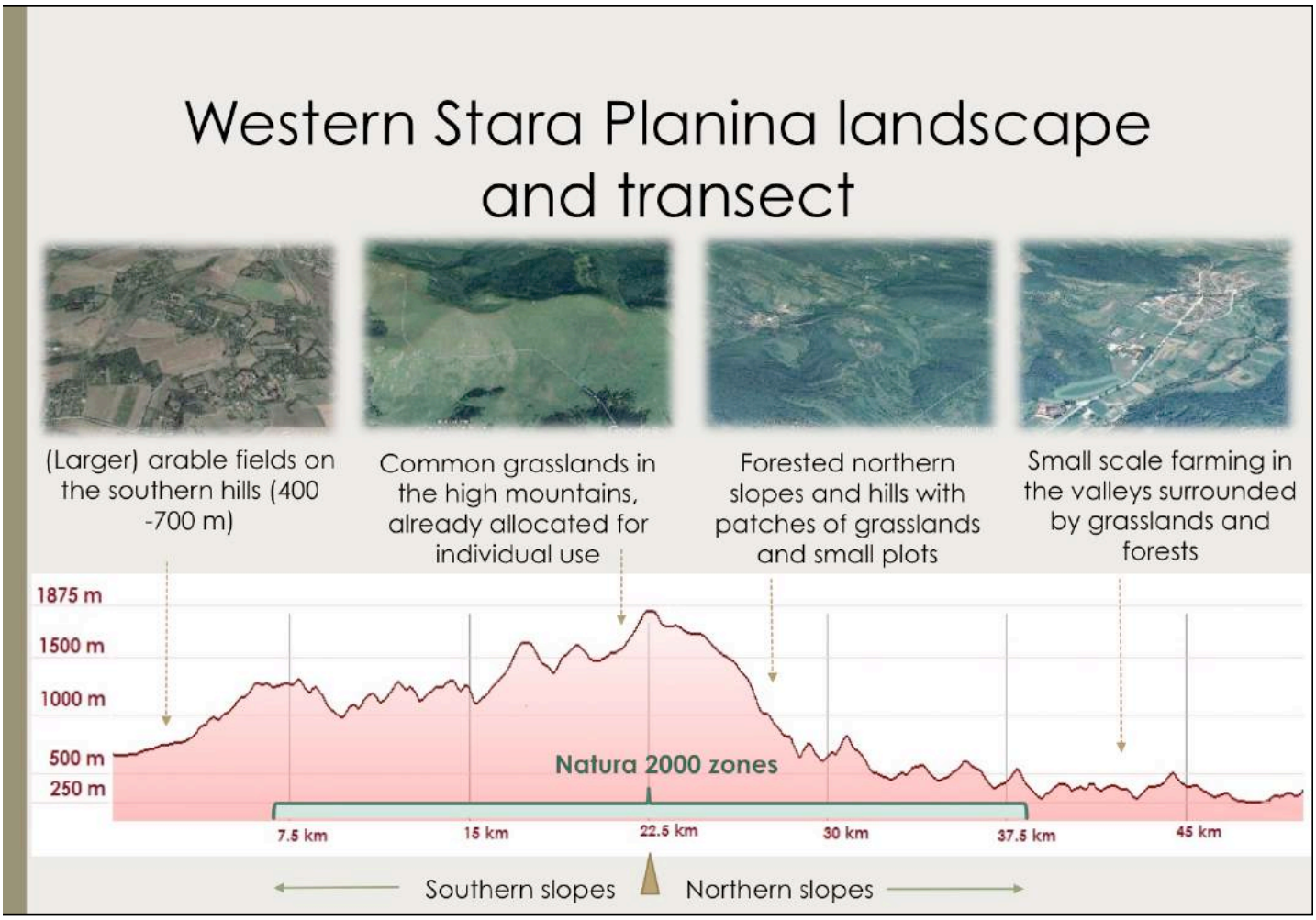
This project has received funding from the European Union Horizon 2020 research and innovations program under Grant Agreement No. 696391



Western Stara Planina is an exceptional region from many perspectives. It is a High Nature Value farming and forestry area with biodiversity richness of national, European and global importance. Geographically, it is close to Sofia. It hosts one of the first spa resorts in the country and the famous Chiprovski carpets. Yet, it is a part of the poorest NUTS II region in the EU, tourism of all its forms is still underdeveloped and depopulation is significant.

At the same time, some of the most innovative HNV farming initiatives have developed in this area. This is due to two developments: the conservation importance of the region attracted the focused efforts of multiple environmental NGOs. Their approach was/is on promoting sustainable economic development that would keep farmers farming. This was positively welcomed by some local farmers who had spent some years working abroad (in various sectors) and came back to the area to start farming. In their communication with the « traditional » local farmers, the new comers acted as agents of change.

Now the territory had a certain social dynamic which nourishes various innovative ideas for development, which is of interest for the HNV-LINK project.



- **Small scale farming in the valleys**

Arable lands in the region are small by area determined by the semi-mountainous relief. Some areas are used for cereals, others are vegetable gardens, available mostly in the proximity of settlements, situated in the river valleys. The favorable micro-climate of the river valleys makes them suitable also for perennial crops (fruit orchards).

The orchards are in extensive land use. Often they border on more or less natural habitats (riparian willow-alder forests, meadows, common lands, oak forests, marshlands). These perennial crops are ranked as HNVF Type 2, but rare plant species do not occur there.

- **Forested slopes with patches of grasslands and small plots**

About 60% of these areas are covered with forests, which makes forestry an important regional sector. The rest of the 40% are farmlands, more particularly grasslands. Part of them is covered with natural (primary) grass vegetation (alpine or high mountain pastures, riparian meadows, stony and rocky terrains), others are of semi-natural character (secondary grasslands), shaped by man by removing forest cover.

Xerothermic grass communities occupy the largest area in the low-mountain and mid-mountain zone of the Western Stara Planina. They are used for grazing but are often fractured by scrub communities or rocky terrains. Mezo-xerophitic grass communities develop on comparatively deep gray forest soils. Some of them have a secondary origin, occupying the original place of former oak forests. They are located at the outskirts of forests or slopes above the river valleys, which provide minimal air humidity. They retain their freshness till the middle of July and are used as hay-making meadows and pastures.

(continuing...)

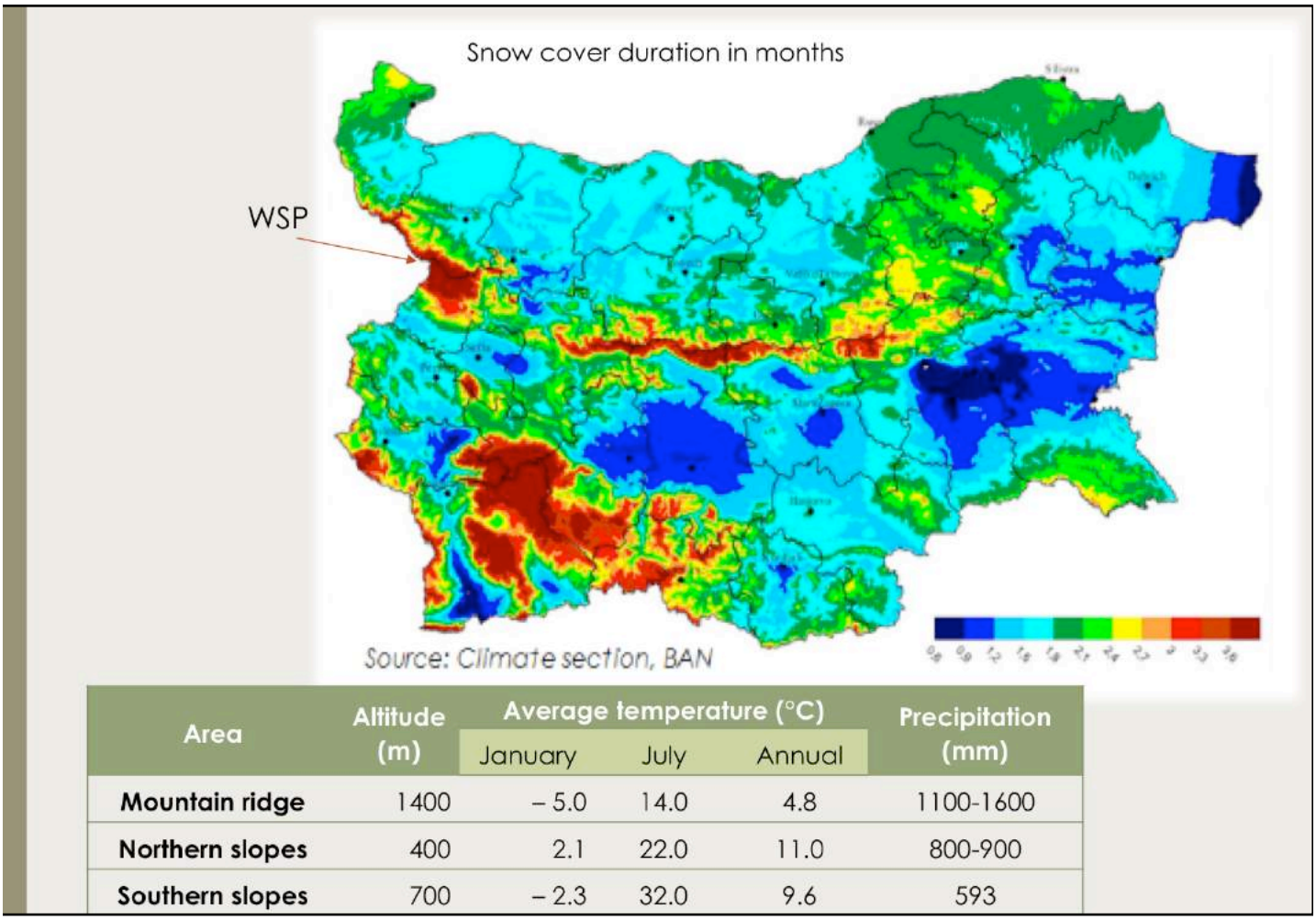
- **Common grasslands in the high mountains**

Alpine or high mountain pastures are widespread above the upper tree line on dry to temperate humid mountain-meadow soils with different depths, and exceptionally on silicate ground rock. They embrace the ridge parts and slopes with different inclination and exposure of the peaks Midzhur, Vrazha Glava, Kopren, Kom and Todorini Kukli.

Alpine pastures with comparatively better qualities can be dominated by violet meadowgrass (*Bellardiochloa violacea*), *Sesleria comosa*, common bent grass (*Agrostis capillaris*), broomy (*Festuca paniculata*) and powerful fescue (*Festuca valida*). These slopes are an important habitat of some rare species, included in the Red Book of Bulgaria - lilium (*Lilium jankae*), narcissus anemone (*Anemone narcissiflora*), spotted (*Gentiana punctata*) and yellow butterwort (*Gentiana lutea*). These farmlands belong to HNVF Type I.

- **(Larger) arable fields on the southern hills**

The relief on the southern hills allows to form larger arable fields, which are used for growing cereals, maize, rapeseed, etc. Even if they are larger for the LA scale, at national level, these cereal producers are small or mid-sized semi-intensive ones.



Area	Altitude (m)	Average temperature (°C)			Precipitation (mm)
		January	July	Annual	
Mountain ridge	1400	– 5.0	14.0	4.8	1100-1600
Northern slopes	400	2.1	22.0	11.0	800-900
Southern slopes	700	– 2.3	32.0	9.6	593

Overall, Western Stara planina region is characterised by moderate continental climate.
However, variations occur with altitude:

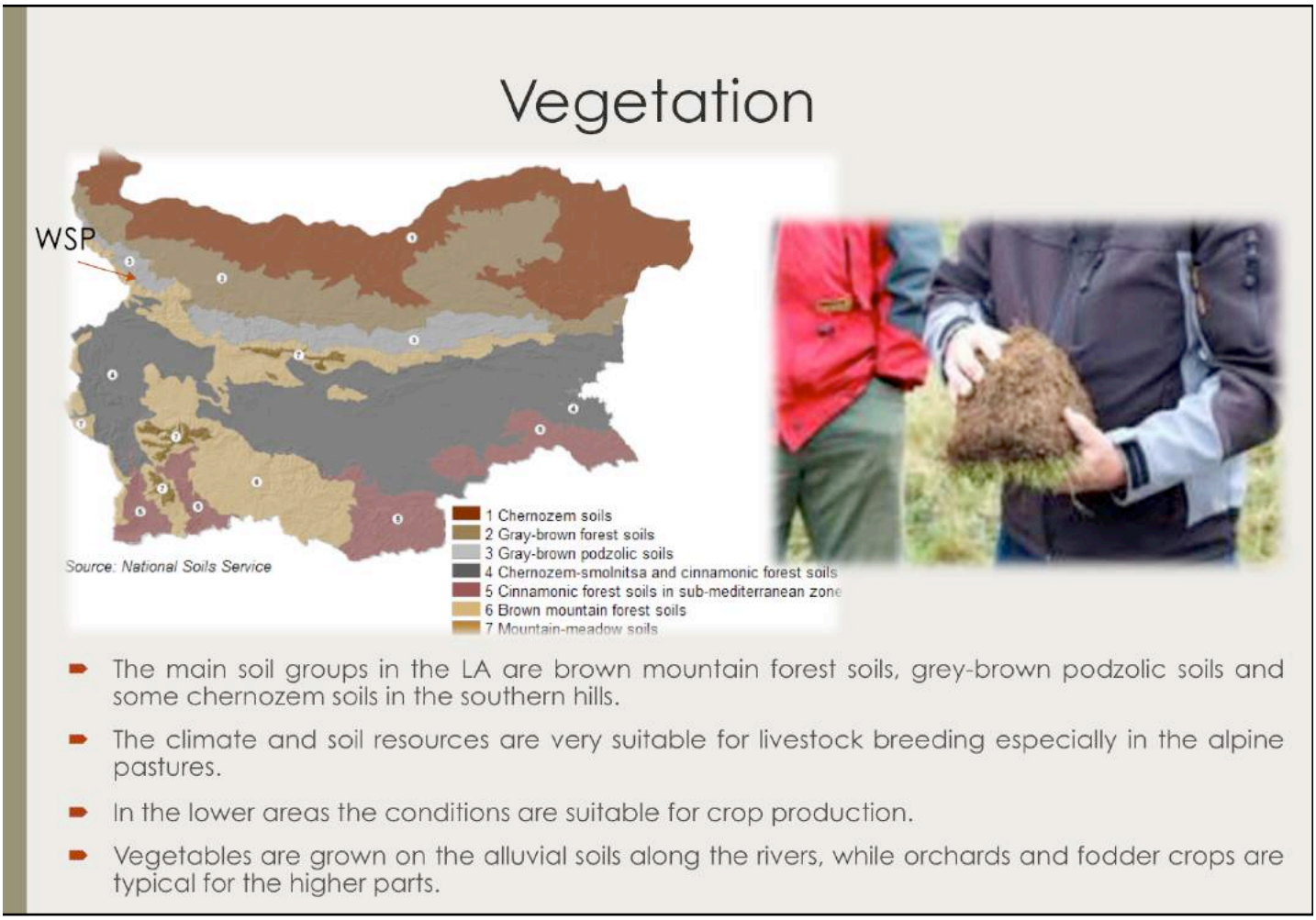
- The mountainous areas have long, cold winters and mild summers
- The hills and lowland areas to the north have mild winters and summers
- The southern hills have cold winters and hot summers.

The great difference in the altitude (which in the Berkovitsa region is on average about 400 m, but at Midzur peak reaches 2 168 m) as well as the presence of different soil and rock types are determining the vegetation diversity in the region and hence the farmlands' biodiversity.

The difference in the altitude leads to differences in temperature and water regimens, both driving factors on the duration of the vegetation period. For example at the foothills of Western Stara Planina in regions of Berkovitsa, Chiprovtsi and Varshets the annual rainfall is about 800 – 900 mm, while on the Kom Peak and in the Petrohan region it reaches to 1600 mm in some years, thus in the high mountains zone there is higher rainfall.

The low parts of the Western Stara Planina region have a temperate-continental climate with maximum rainfall in spring and summer seasons (May – July).

In the higher areas precipitation is high in spring and early summer, and in autumn.

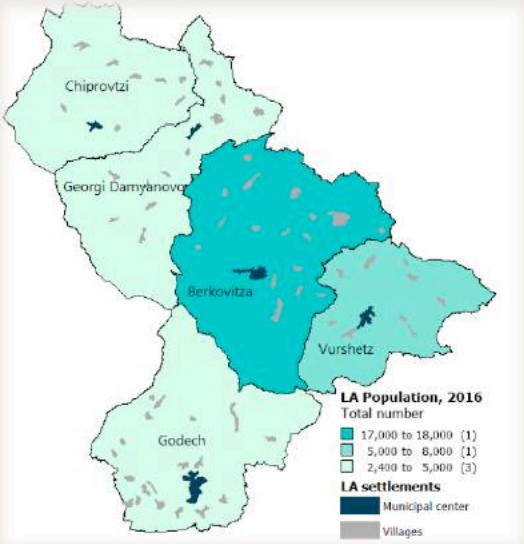


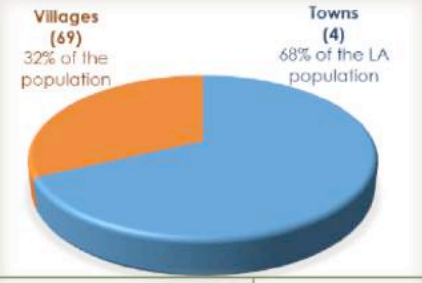
The duration of the vegetation period in mountain pastures and meadows is comparatively short: 5-6 months (April – October), but the favorable rainfall regimen contributes for their freshness and greenery to last nearly 4 months.

Lower areas have a vegetation period of 8-9 months (March – November), but the high temperatures and the scanty rainfalls provide meadows and pastures for freshness for not more than 2 months. In these lower areas the hay-making of meadows should not be later than the end of June. Delay in hay-making worsens the meadows' quality, because of the invasion of weeds, which possess the ability to give minimum two generations for a vegetation period.

In the beginning of the summer (beginning of July) meadows and pastures in lower West Stara Planina dry up and become yellow, while at the same time plants in mountain meadows and pastures are in blooming.

Human geography





Population (number)	Settlements (number)
0 to 100	38
101 to 500	28
501 to 2 000	4
2 001 to 10 000	2
over 10 001	1

- The total population in the LA in 2016 is **35 676** located in 73 settlements.
- The majority of the settlements have a population of less than 500 people.
- The average population density is 21.5 people/sq.km compared to 31.5 for all rural areas and 65.5 for the country.

The area is known for the ethnic cultures and traditional festivals, crafts and cuisine of the 'karakachans' and the 'torlaks' including the famous Chiprovtzi hand-made carpets. A lot of these traditions are related to the farming systems practised in the past – sheep grazing in the mountainous pastures, wool used to produce the carpets and local herbs and flowers used to colour the wool.

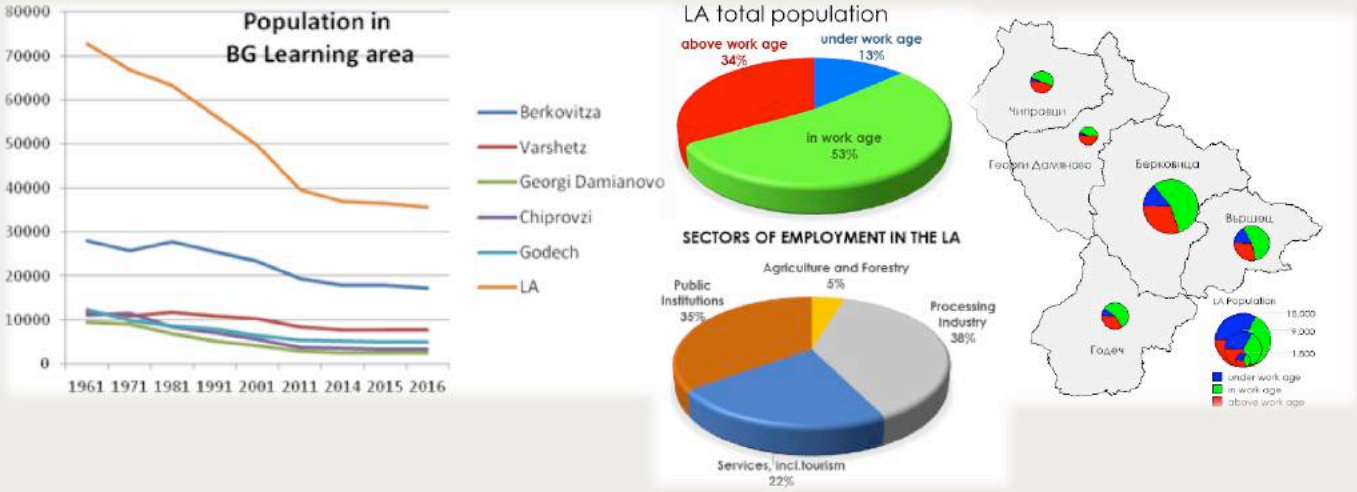
Population decrease in the region is observed since the early 1960s. In the mountainous areas and municipalities - Georgi Damyanovo, Chiprovtzi and Godech this process was evident from the early 1970s to late 1980s during the period of "developed socialism" and industrialization of the country economy.

In the early 1980s an increase of population is observed in the lowland municipalities (Berkovitsa and Varshets), where besides agriculture, light industry and forestry are developing with good pace. Nowadays, the population is half it used to be in the 1960s. Half of the villages have a population of less than 100 people, mostly pensioners.

There are four small towns in the LA which are the development "hubs" of the territory. Todays production, processing and service facilities are located there. The villages are depending on farming (a majority of semi-subsistence farms) and social payments (pensions or unemployment support).

The roads are mountainous with many turns and steep slopes, so the access to the area is unfavourable, especially during winter.

Human geography



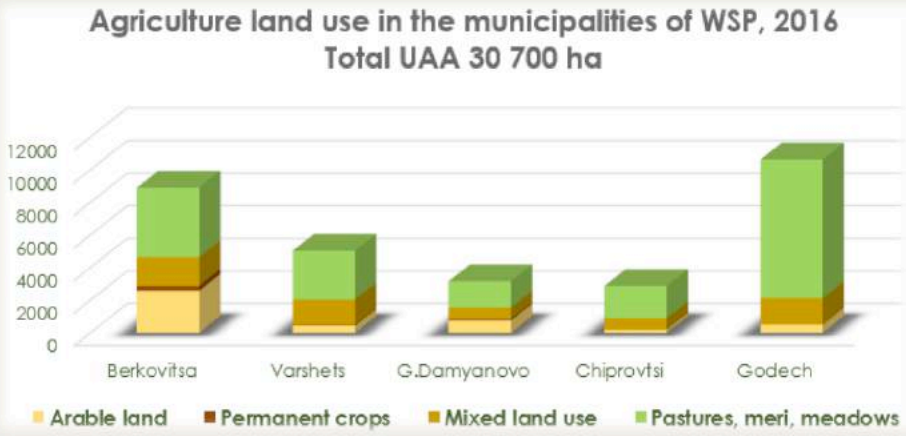
- Depopulation is ongoing in the LA and in two municipalities the people above working age are already predominant.
- The employment structure in the LA reveals that the processing industry and the service sector provide most of the private sector jobs (38% and 22%)

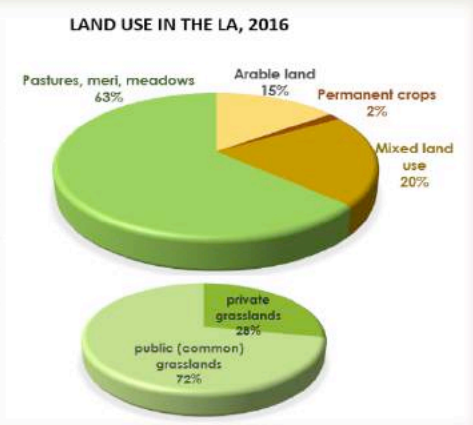
The public sector jobs (administration, education, social and health services) are very important in the LA, representing 35% of all jobs.

The official jobs in agriculture and forestry are only 5%, a figure that 'masks' the hidden engagement in farming by part-time farmers or retired people and/or people on unemployment support.

The share of unemployed in the LA is between 15% and 35% which is among the highest in the country. The side effect of it is that people lose their working habits and come to rely on social payments. a

Agriculture key facts: Land use





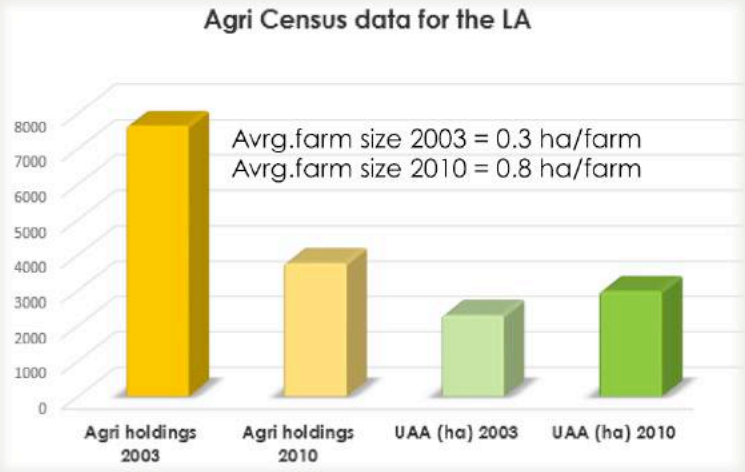
- The mountanous relief and climate determine the land use in the LA – the majority of the UAA is pastures and meadows (63%), of which common grasslands are 72%.
- Mixed land use (20% of UAA) is a result of the small scale farms and is located nearby the settlements and in the river valleys
- Overall, arable land is limited (15%) and is mostly in the lowlands
- The economically important permanent crops are represented mostly by strawberries and raspberries in Berkovitsa municipality.

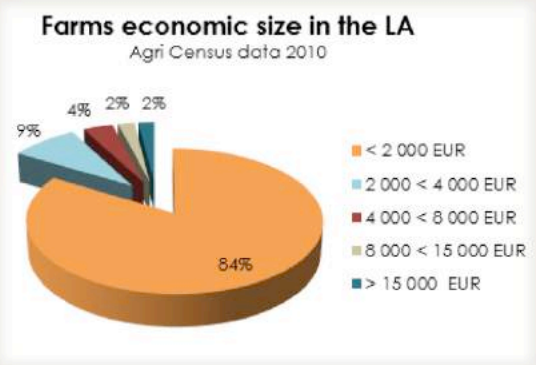
The utilized agricultural area in the LA is dominated by pastures and meadows many of which are public. Historically, they were used as common grasslands but the introduction of the CAP Pillar I payments led to changes in the use. The rules of the allocation of municipal pasture changed frequently but the current rules give priority to livestock farmers from the municipality.

The result of the new requirements and rules is allocation of the most « fit » grasslands for individual use to farmers applying for CAP payments.

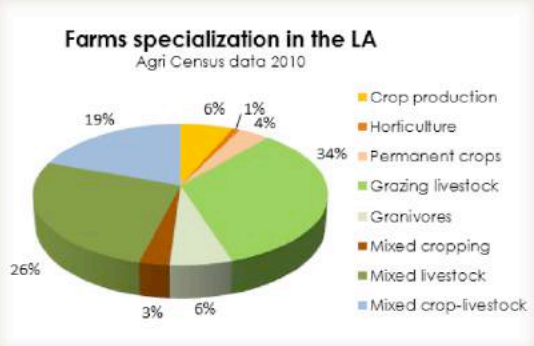
The pastures in worse conditions in terms of scrub / tree encroachment are designated for common use by subsistence farmers in the villages that do not apply for subsidies.

Agriculture key facts: Farm types and size





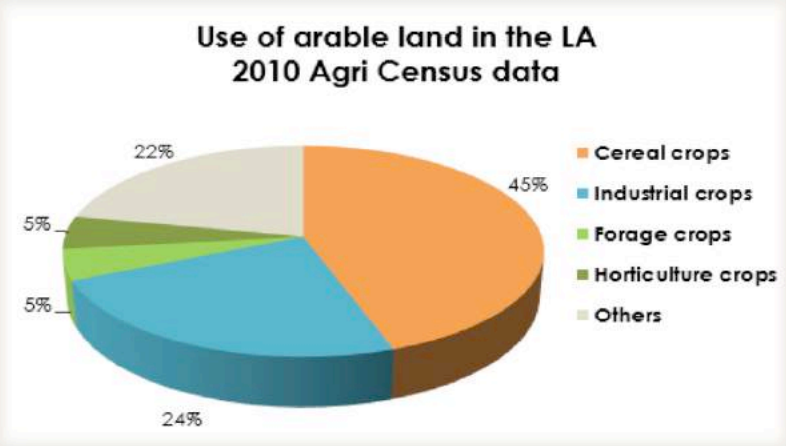
- The majority of farms are small both in size and economic units, below the threshold for CAP support of 1 ha.
- More than half of the farms are in livestock grazing and mixed farming systems.



The high nature values of the LA are maintained by the dominant farming systems in the region – grazing livestock (34% of all farms), mixed livestock (26%) and mixed crop-livestock farms (19%).

However, the more profitable systems (economic size of more than 15 000 Eur) are in crop production and horticulture.

Agriculture key facts: Crop production



- The soil types in the lowlands are suitable for cereals production but larger scale farms are hampered by the rugged relief.
- Rapeseed production is a new trend in the lowlands of the LA.

Arable land covers only 15% of the UAA in the LA. Nevertheless, the production systems on them replicate the farming model promoted by the CAP Pillar I payments – cereals and industrial crops. A new crop in the LA, as elsewhere in Bulgaria, is rapeseed cultivation, produced mostly for biofuels and less for oil)

The combination of climate, soils and altitude in Berkovitza municipality is favourable for the production of strawberries and raspberries, which has been restored in the last decade after the abandonment in the post 1989 period. The strawberry fields are mostly organic, and despite the more intensive organic system – strawberries from Berkovitsa is a recognised image for tasty strawberries.

Sheep breeding is typical for the municipalities in the LA. Prior to 1989 there were around 200 000 sheep in the area. There was a huge drop in these numbers after the dissolution of the cooperatives post-1989. It is only in the recent years that the number of livestock started increasing due to two main stimulus. The introduction of the coupled support schemes in 2014 and the revision of the rules for the allocation of municipal grasslands in 2015, which allow farmers with grazing animals to get the rights for grazing without tender procedures.

In 2016, there are 19 504 sheep, 7185 goats, 7185 cattle and 1446 equine according to the data in the Veterinary Registers. Sheep and goats are bred mainly for meat, while cows are raised mainly for milk. Repliana and Karakachan local sheep breeds are typical for the area and their number is increasing (mainly due to the AE support). Sheep and goats are grazed throughout the year on the mountain grasslands and around the settlements (in winter). Sheep breeds are not with high productivity. The average productivity is 40 litres of milk/ year, which is not enough to meet the requests for the national support schemes (70 litres/sheep/year). The average price of the sheep milk is between 0,61 EUR/litre and 0,71 EUR/ litre if sold to the dairies that operate in the region. The price can reach 1,02 EUR/litre if the milk is sold directly to the final customers.

Lambs are sold at 3.58 EUR/kg. The demand for lambs is high. Farmers believe that they can sell as much lambs as they have. The market for the sheep wool is limited or almost non existing even though the famoush Chiprovtzi carpets are produced in the region. Most farmers do not sell the wool, a few sell it in Sliven (South Bulgaria) at 0,51 EUR/fleece. Several farmers are also registered to process dairy products on their farms and to sell the products directly to the final customers. Some of them are supported by the Swiss HNV project in the regions to by equipment for their on-farm processing units.

(continuing...)

Cow milk is sold to 3 or 4 big dairies “Mogila”, “Parshevitza”, “Slivnitza”, “Voinov”. Prices depend on the milk quality and quantity. The average price for 2016 was 0,27 EUR/ha. Many of the dairy farms were unable to meet the increased legal, food safety and hygiene requirements and are currently transforming to suckler cows. Although the consumption of beef and veal meat is not typical for Bulgaria the number of the farms for suckler cows is increasing. The meat is sold mainly in Sofia.

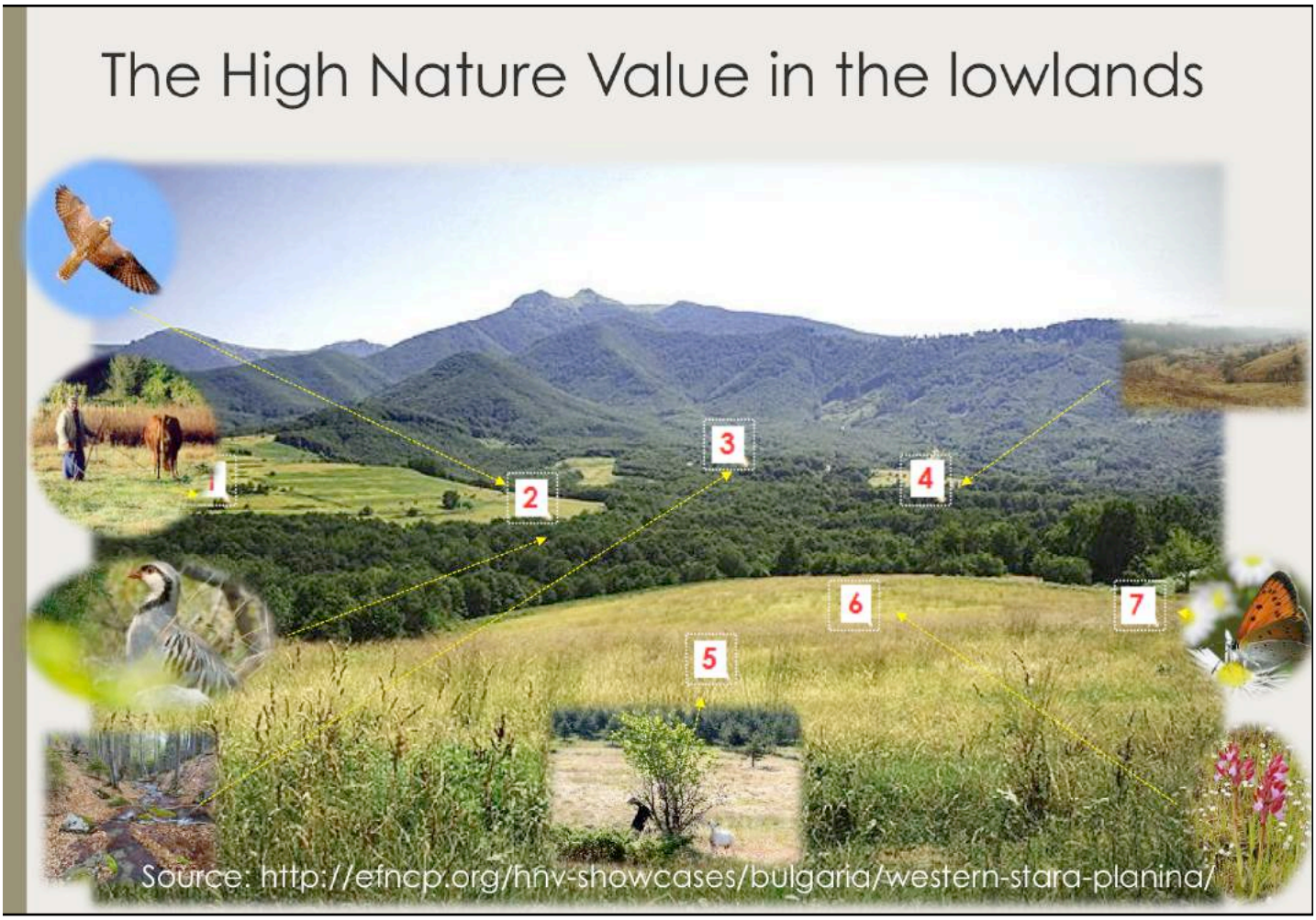
Most of the grazing livestock farmers do not have a problem with selling their products, but the income is not sufficient to continue with their agricultural activities because of the too small farming units. EU and national support schemes are of key importance for the continuation of development of the livestock breeding in the area.

The extensive character of agriculture in general and livestock breeding in particular, the low population density, the mountain relief and the proximity to the border with Serbia (which had a special access regime limiting economic activities in the past) have influenced positively the biodiversity in Western Stara Planina.

The designation of seven Natura 2000 sites in the region (5 SPAs and 2 pSCI) underline the high nature value and conservation importance of WSP.

The territory hosts many rare plants included in the Red Data Book of Bulgaria and protected by international red lists and conventions (IUCN, CITES) such as *Himantoglossum caprinum* , *Eranthis bulgaricus*, *Ophrys, Astragalus wilmottianus, Alchemilla straminea.* Medicinal plants are an important part of the regional flora but are often subject to strong anthropogenic pressure: harvesting for commercial purposes or personal use - *Adonis vernalis, Linum austriacum*, *Asarum europaeum*, *Linum austriacum*, *Hypericum cerastoides.*

Animal species are representative of the Middle European and Euro-Siberian fauna. Many are included in Natura 2000 *(Bombina variegata* , *Lucanus cervus*, *Coturnix coturnix*, *Lanius collurio*, *Emys orbicularis)* or are included in the Red Data Book of Bulgaria and protected by international red lists and conventions (IUCN) (*Canis lupus*, *Ichthiosaura alpestris, Lynx lynx, Falco cherrug, Crex crex).*



[1] Mosaics of low-intensive arable land and orchards near settlements. Grazing takes place on fallow land and crop residues. In many places they are adjoined to riparian forests, meadows, marshland or coppice. This is a valuable habitat for certain butterfly species and song birds, but threatened because of the limited socio-economic opportunities in rural areas.

[2] The pastures and meadows of Western Stara Planina are semi-natural habitats of great importance for the conservation of raptors such as saker falcon (*Falco cherrug*), short-toed eagle (*Circaetus gallicus*) and golden eagle (*Aquila chrysaetos*); wet meadow birds such as corncrake (*Crex crex*); and shrubland birds such as rock partridge (*Alectoris graeca*) – all priority species according the EU Birds Directive. Egyptian (*Neophron percnopterus*) and griffon vultures (*Gyps fulvus*) have already disappeared as the number of sheep (and thus carrion) has fallen.

[3] A large part of WSP is covered by forests. Half of the deciduous forest consists of beech (*Fagus sylvatica* and *F. moesiaca*), and some are classified as ancient forests aging 100-320 years. Coppice forests with oak (*Quercus frainetto*, *Q. cerris*, *Q. dalechampii*) and European hornbeam (*Carpinus betulus*) are omnipresent in the proximity of settlements. The coniferous forests consist of some pine plantations as well as ancient spruce forests (*Picea abies*). Forests in the region are threatened by quarrying, unsustainable forest management, massive illegal logging, as well as plans for large-scale ski resorts.

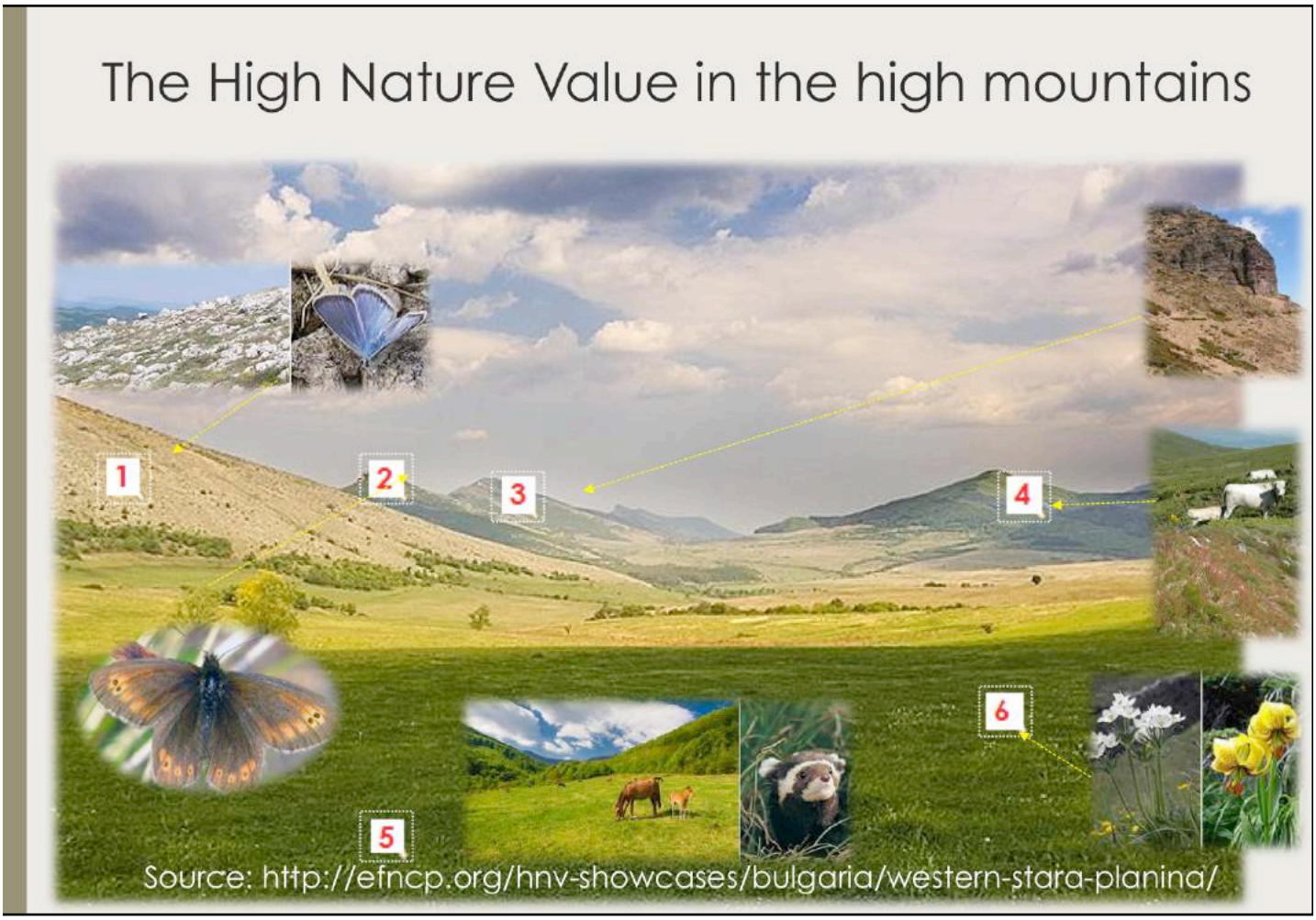
[4] The region underwent a dramatic drop in livestock numbers in post-1989 period (over 90%). Abandonment of low-intensity grazing was particularly serious on grasslands at longer distances from settlements and at higher altitudes. It had a negative impact on floristic biodiversity and results in a structural change from an open to a closed landscape (scrubland, forests) which in turn has impact on fauna species. Many long-term abandoned grasslands had converted to forests and were even re-classified as forests in the land registers.

(continuing...)

[5] Semi-natural dry grasslands on calcareous substrates are the most widespread grassland type in the low- and mid-mountain zones of the region. They are traditionally used for pasturing, but on semi-dry soils mowing takes place. Cessation of agricultural activity and undergrazing resulted in scrub invasion by dog rose (*Rosa canina*), blackberry (*Rubus*), hawthorn (*Crataegus*), wild pear (*Pyrus communis*) and the subsequent loss of the habitat.

[6] The xerothermic grass communities are important for orchids, and are classified as priority conservation habitat type 6210 Semi-natural dry grasslands and scrubland fasciae on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites). The following orchids can be found in the LA: usual (*Orchis morio*), buggy (*Orchis coriophora*), singed (*Orchis ustulata*), crimson (*Orchis ustulata*), trident (*Orchis tridentata*) and butterfly-blossom (*Orchis papilionacea*) orchid.

[7] Mesophile meadows develop on periodically flooded river terraces in river valleys up to 700-800 m altitude and are classified as Lowland hay meadows (6510). These grasslands depend on late mowing or grazing at about 1 livestock unit per ha and no or limited fertilisation to conserve their floristic richness. Depending on their proximity to settlements they face abandonment, undergrazing or overgrazing. Where they are to some extent nitrified or ruderalised, large copper (*Lycaena dispar*, listed in the Appendix II of the Habitats Directive 92/43) feeds on plants such as docks and sorrels (*Rumex*).



[1] Rocky slopes at high altitudes provide a limited grazing resource. Rare plants such as *Androsace obtusifolia* (a rock jasmine) can be found, as well as the rare and threatened butterfly false eros blue (*Polyommatus eroides*).

[2] Bulgarian ringlet (*Erebia orientalis*) is a Bulgarian and Serbian endemic butterfly. In Bulgaria it is confined to the alpine grasslands of Stara Planina, Rila and Pirin above 1400m, often in the proximity of the tree line.

[3] The most widespread high-mountain grassland type in WSP are the *Nardus grasslands* which occur above the tree line on siliceous, dry and poor soils. Large areas of these alpine pastures are dominated by mat-grass (*Nardus stricta*), a grass with relatively low nutritional qualities. They have a great floristic diversity, and are classified as Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas, 6230 according the Habitats directive. Grazing at low stocking densities is necessary to maintain the habitat.

[4] Along ridges and slopes of shallow (up to 10 cm) and stony soils, often also like spots among mat-grass pastures, communities of mountain low shrubs are formed, dominated by European Blueberry and Bog Bilberry (*Vaccinium myrtillus* and *V. uliginosum)*, *Bruckenthalia spiculifolia*, low greenweed (*Genista depressa*), broom seeds (*Genista sagittalis*). This type of vegetation is not so preferable for grazing. Communities of low shrubs have increased their area, especially after burning down of siberian juniper (*Juniperus sibirica*) in the past. Due to the severe decline in livestock numbers in the previous decade the opposite process started and the Juniper vegetation has increased significantly occupying its old habitats, especially along the dry ridge parts. This type of farmlands is ranked as HNVF Type I, the habitats belong to 4060 Alpine and Boreal heaths.

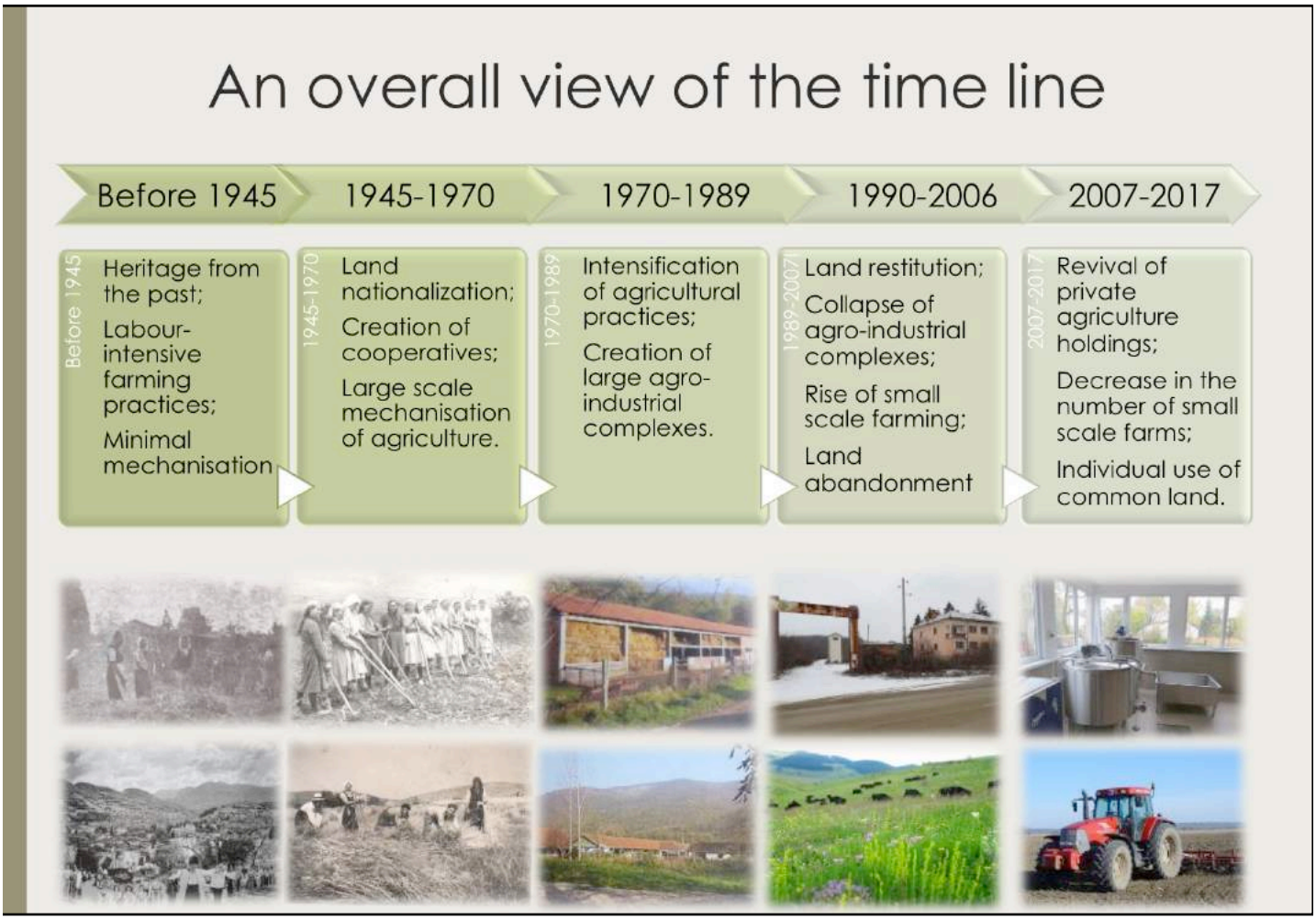
(continuing...)

[5] Dry to temperate-humid grasslands at an altitude between 1000m and the tree line are common in the WSP and classified as 6520 Mountain hay meadows. They are relatively productive semi-natural grasslands as they develop on well-moistened soils, with good forage qualities and a vegetation period of up to 6 months. They are appropriate for hay-making, but are nowadays more commonly used for pasturing, or abandoned. Their deep soils provide good nesting opportunities for the European souslik (*Spermophilus citellus*) and its predator the marbled polecat (*Vormela peregusna peregusna*).

[6] Narcissus anemone (*Anemone narcissiflora*), spotted gentian (*Gentiana punctata*) and great yellow gentia (*Gentiana lutea*) and a lily (*Lilium jankae*) occur in temperate-humid mountain hay meadows and are listed in the Red Book of Bulgaria. Mowing or grazing at low intensity is necessary to maintain their habitat in a good condition.

The time line

- Explaining the present with the past



The timeline is divided to five periods on the basis of the main developments related to agriculture at national level.

[1] Before 1945: Characterised by extensive farming systems and semi-subsistence farms

[2] 1945 – 1970: Nationalisation of land and production resources for the creation of cooperatives. The first period of real intensification of land use through mass introduction of mechanisation.

[3] 1970 – 1989: Further intensification and specialisation of agriculture production by aggregating the cooperatives into Agro-Industrial Complexes.

[4] 1990 – 2006: The period started with a transition from socialist planning system to market economy. Land restitution to the heirs of the previous owners and the dissolution of the cooperatives led to significant land abandonment and rise of subsistence and semi-subsistence farming. There was almost no public support to farming in this period.

[5] 2007 – nowadays: Started with accession to the EU on January 1st, 2007 and introduction of CAP support. The Pillar I payments- SAPS scheme stimulated the return to farming. Subsistence farms decreased by half and new private agriculture holdings emerged.

Heritage from the past

- The pre-modern legacy up to 1945

The rural society

- In this period 80% of the population in Bulgaria was in rural areas. There were no big towns in the LA so the share of rural population was even higher here.
- The railway services started developing and the road network was being paved, which improved significantly the access to the region in early XXth century.
- At that time, one of the settlements – Varshetz was getting famous as the first spa resort in Bulgaria, which led to development of tourism in the region.

Nevertheless, there were not many job opportunities outside farming and poverty was widespread.

The state policy aimed to reduce it by adopting regulations for providing land to the poor and/or landless people so that at least they can sustain their needs. An upper limit on the land ownership was introduced.

A law from 1906 provided inheritance rights to women – they could get a third of the land of their brothers.

Farming

Men and Women, Farms, Products, Markets

A hut near Meliane village

Bulgaria		1926	1934	1946
Agricultural holdings	no.	750 000	884 869	1 100 000
Average farm size	ha	5,7	4,9	4,3

- Mainly subsistence farming within the extended family;
- Extensive farming systems with high demand for labor and limited mechanization;
- Overall, many small farms with high land fragmentation due to the existing tradition to divide the land between the heirs.
- In the 1930's and 1940's the economic situation of villages improved.
- In 1913 the share of the marketed production was 43%, and increased to over 50% by 1941.

Extensive agriculture was a leading sector of the economy of the LA. Before 1878 sheep breeding was very well developed because of the high demand on the Turkish markets for meat, leather, wool, milk and milk products. After the independence of Bulgaria in 1878, the majority of the land owned by the Turkish population was sold to Bulgarian peasants. Due to the limited funds, they bought relatively small land parcels, which led to land fragmentation and creation of small and medium scale family farmers.

In the period 1900-1912 the land was further fragmented due to the increasing population in the villages and thus, the increasing number of land heirs.

Before the Balkan and First World wars farming was primitive and very extensive – the increase in the agricultural production was reached by an increase of the arable land and the number of livestock. Prior to 1940, more than 63% from the farms in Bulgaria were between 0.1 ha and 5 ha (Varshetz newspaper, October 1938)

The first voluntary cooperatives emerged in the late 1930s in the area. They were mainly groups of the extended family members and their neighbours that united to for the agricultural work like harvesting, mowing, etc.

In sheep breeding, a very popular form of cooperative was “bachia”, where a group of farmers produced together cheese.

Landscapes and environmental value


ВЕТЕРИНАРНИ

Veterinary news presenting analysis on the number of grazing animals and consumption of meat in Vurshetz municipality for the period 1930-1939

Bulgaria	1897	1926
Common grasslands (ha)	970 200	152 400
Arable land (ha)	2 975 000	3 628 000

- In Bulgaria, but also in WSP, the arable land was usually divided in 2 fields:

  the first field was used to cultivate wheat, corn, fodder.
  the second field was resting and used for grazing the animals.
- The household's usual practice was to have one house in the village, where the family lived during the winter and a "hut" in the mountains where the animals were grazed in the summer months. There were some arable land and orchards (plums, apples, etc.) near the huts too.
- Some of the alpine grasslands already had encroachment processes and local newspapers were citing expert's recommendations to clear the grasslands in the 1940's.

In the LA, the focus was on sheep breeding. The herds were around 10 sheep. Cows and buffalos were used as draft animals. Goat breeding importance was increasing.

There was limited mechanization - mainly replacing the wooden plows with iron plows. The mechanization started increasing mainly due to the credit policy of Bulgarian agricultural and cooperative bank. However, a limiting factor for the mechanization was not the land fragmentation, but the cheap (even free) working force which made it more feasible to use the family labour than to invest in machinery.

An article in Varshetz newspaper (1938) presented a good overview of the problems and perspectives to livestock breeding in Varshetz municipality.

"The main reasons for the reduction of livestock in Varshetz Municipality are:

- ✓ Reduction in the municipal and state pastures due to relocation for other uses;
- ✓ Strict protection of forest sites from cattle breeding which is leading to reduction in livestock numbers;
- ✓ The economic crisis led to a reduction in livestock;
- ✓ The improvement of the quality of livestock breeds led to a reduction of the animal numbers.

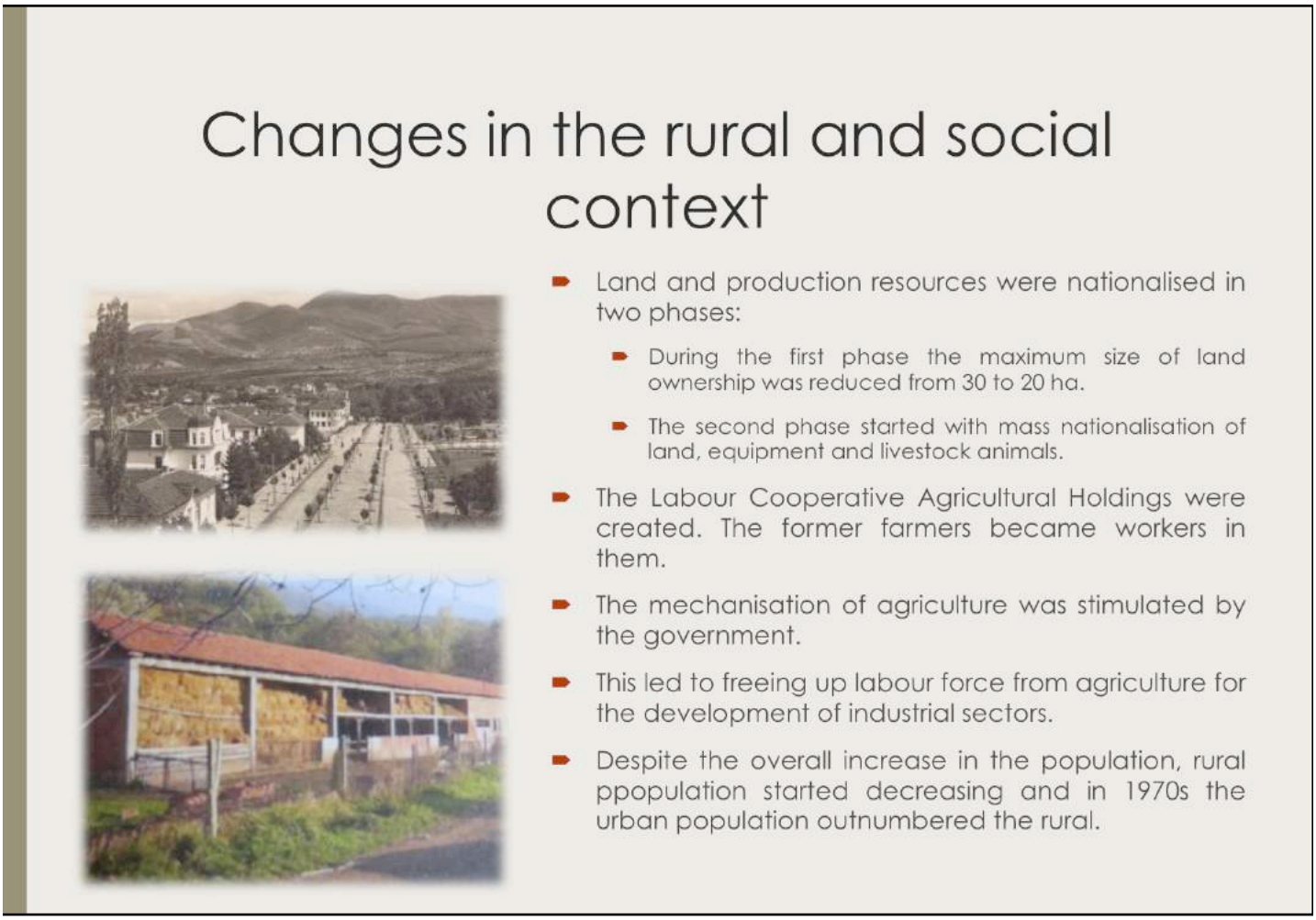
(continuing…)

Reasons for the development of the livestock in Varshets municipality:

- Varshetz is developing as the only spa resort in northern Bulgaria and is visited annually by over 20,000 guests. During the summer months the demand for meat, milk and milk products is increasing significantly and their long-distance delivery is difficult and expensive;
- Poor conditions for cash crops, limited arable land and rough terrain are an obstacle for land consolidation and mechanization, so buffalos and oxes will remain the main driving force;
- Poor soil quality in need of manure that cannot be replaced by costly chemical fertilizers;
- The large pastures, after being cleaned of the bushes and equipped with shelters and water supply, will create good conditions for sheep breeding and dairy production in the region;
- The cool climate and the high meadows are among the most favourable conditions for sheep breeding and dairy production in the region;
- The nutritious food products for local population will raise the living standard of the population in the region;
- The abundance of feed allows the development of a much larger and modern livestock breeding. A proof of this is the fact that dozens of cars with meadow hay are exported from the region each year. The hay can be used for feeding more animals and the manure can be spread on the poor arable soils."

Period 1

- 1945 – 1970 Land nationalisation and creation of cooperatives



Land nationalization was enforced with the Law on Labour Land Property which decreased the upper limits for (arable) land ownership from 30 ha to 20 ha. The maximum non-labour land property was 10 ha per family.

The limit for the forests and grasslands was 5 ha for the hilly and flat areas and 10 ha for the mountain areas.

The outcome of the upper limits on private land led to establishment of a "State Land Fund" which accommodated all nationalized land. During the first phase it started with 56,400 ha and increased to 243,800 ha including the land owned by municipalities, churches, cultural centers and schools. This first phase impacted only the owners of larger farms, which were not many in WSP.

In the second phase of mass land nationalization almost all agriculture land was in the State Land Fund. When the Labour Cooperative Agricultural Holdings (LCAHs) were established they were allocated land from the State Land Fund from their region. They had on average 250–300 ha of arable land and had the right to use state and municipal land. In general there was one LCAH per village, which managed the local land.

The main instruments for regulating the private vs LCAH agriculture production were the Sowing Plans. This systems was giving rights to farming peasants to keep maximum 600 g wheat/day/person and 200 g maize. Farmers were also obliged to sell 1/3 of their hay; ¼ of the wool and all leather at regulated prices that were 1/3 of the market prices. The newly introduced legislation and tax systems gave preferences to the cooperatives (LCAHs).

Livestock was also nationalized. After entering the LCAHs, farmers were allowed to have only 1 cow/buffalo and up to 5 sheep/goats which led to a reduction in livestock numbers in the area for a short period.

In 1947, a law to nationalize the agricultural equipment was adopted. The nationalized equipment was the basis for creation of 70 State Mechanization Centers in 1950 that provided services to the LCAHs in a planned manner.

The mechanization of agriculture freed labour force for the industry, which was a priority for the government.

The population of Bulgaria increased in the period, but rural population started to decrease. In 1970's for the first time the urban population became more than the rural.

Agricultural development in the period 1

Arable land allocated for private use was 20 – 30% of the total village arable land.

The plots for private use were located near the settlements and formed the mosaic landscape around them. They were used mostly for fruit and vegetable production for family needs.

Land use change in two LA villages	Tuden		Shuma	
	1956	2016	1956	2016
Arable land	384	546	251	501
Land for private use	123	-	101	-
Total arable	**507**	**546**	**352**	**501**
Meadows	124	136	186	192
Pastures	299	245	503	310
Pastures with scrub & abandoned arable	23	111	57	9
Total grasslands	**446**	**492**	**746**	**511**
TOTAL	**954**	**1039**	**1098**	**1013**

- Cooperatives (LCAHs) had annual production plans. Some of them introduced new crops not typical for the region (for example tobacco).
- Livestock breeding continued to play an important role. Alpine grasslands were used for grazing of cooperative's livestock from May to October.
- Some of the existing 'bachia's were transformed into dairies. The products were sold mainly to the distributing companies in Sofia and the big cities.

The main driving forces for that period were land nationalization and the introduction of the central planned economy. Every decision by the LCAH was in fact regulated by a decision of the Ministry of Agriculture. State regulation and legislation of the economy in general and agriculture in particular became the norm.

The state policy for agriculture was focused on modernization meaning mechanization of all possible production processes. However, this was possible mainly in the lowlands and had less effect in the LA in this period. There, a lot of the production processes were still done manually.

The LCAHs formed bigger herds of livestock animal that were grazing on the alpine grasslands in the summer months.

The intensification of arable production aimed to gain maximum yields and to ensure the supply of food to the increasing urban population and for export to other socialist countries. However, in the LA due to the mountainous relief, this happened in a limited extent.

Consequences on land use and biodiversity

- The mountainous relief prevented the large scale mechanisation of production practices. Most of them were still performed manually, hence there were no significant negative effects on the landscape and species.
- The new crops that were introduced in the region were at small scale which localised any potential effects.
- Furthermore, it is a border region to Serbia, so the access to a belt of 20-50 km wide along the border was strictly regulated and the economic activities were minimal.

Overall, the cooperative livestock flocks and herds that developed in the 1950s and 1960s were sufficient to maintain the grasslands from scrub encroachment.

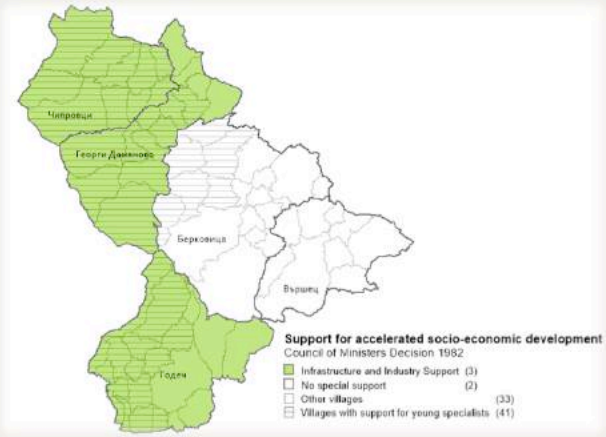
Forestry activities were performed following 10-year management plans and considered the natural characteristics of the forests and forest pastures well.

Period 2

- 1970 – 1989 Agriculture intensification and creation of Agro-Industrial Complexes

Changes in the rural and social context

In 1977, a Party decision increased the role of local authorities by providing them governance functions in terms of local infrastructure and social development.



- 1982 Council of Ministers decision provided targeted support to less developed, border and mountainous regions on the basis of programmes for accelerated socio-economic development:
- Industrial enterprises were opened in the municipalities from these regions to provide employment opportunities in rural areas.
- Young specialists (under 45 years) and families were given support to settle in selected villages.

The peak number of people in the LA was in 1981: 63 292 people, after that it started declining (to slightly above 35 000 today). The year of peak population in Bulgaria was 1985 - 8,95 million people.

The support for border and mountainous regions was divided in two parts:

The first one was focused at municipalities in which local administrations were provided support to improve the infrastructure and to open facilities/workshops of various industrial enterprises.

The second type of support was directed at selected villages in the municipalities for young specialists and families to settle in them. The types of specialists listed in the regulation were teachers, doctors, livestock breeders, agronomists, etc.

The type of support provided was one-off support for the settling; transport costs; easier access to housing or permissions for construction, etc.

The level of support depended on the size of the family (number of children).

The rural economy in this period was characterized by further intensification of the agricultural production and rapid development of the industry. Almost in each region an industrial enterprise was created and the population was engaged there.

The LCAHs and the State Machine Centers were merged and Agro-Industrial Complexes (AIC) were created. State agricultural enterprises (SAE) and large livestock breeding complexes were also created. The total number of cattle in Bulgaria reached 2,350,000 in 1989 and the number of the sheep increased to 18 million heads.

During that period the production of agriculture increased by intensification. New, more productive breeds

Agricultural development in the period

- The cooperatives were grouped into larger Agro-Industrial Complexes (AICs). Each AIC had to develop also industrial activities to provide for diversified employment in the rural areas.
- In this period rural households were allowed to have their own farm/livestock. The limits for livestock numbers were not observed strictly, thus permitting private farming practices to develop.

Statistical data from that period is very limited, but several interviews with farmers and former AIC workers provided insightful information:

A former worker of the Agro-Industrial Complex "Gavril Genovo" (Chiprovtzi) municipality recalls:

In 1978, the agricultural land of Prevala village (which has the biggest share of pastures in Chiprovtzi municipality) was included in AIC Gavril Genovo. In1979-1980 several AICs were grouped and the AIC "Beli Mel" was created. Later, it was transformed to Livestock Breeding Complex "Beli Mel". They had 9-10 sheep herds with around 250 sheep/each. Usually one family was taking care of one herd. Lambs were exported to the Arab countries by ship-loads. There were 2 dairies – in Beli mel and Gorna Luka."

One of the biggest and most successful Agro-Industrial Complexes was in Varshets municipality. Its former director Mr. Anton Mateev (1979-1992) describes:

The agro-industrial complex (AIC) Varshetz had 8000 ewes, 2000 lambs for repair and 800 cattle, of which 150 heifers in the village of Gorno Orizovo and a fattening facility in the Cherkazki village. A working unit for perennials was created in Cherkazki. All villages of the municipality had sheep pens – a total of 50 solid buildings with electricity, water and asphalt roads. 12 000 people lived in the municipality between 1979 -1992. 1200 people worked at AIC Varshetz: 500 permanently occupied in production and 200 temporary seasonal field workers. The AIC was a separate legal entity, which was managed by a general meeting of cooperative members. The Chairman and the Deputy Chairmen were elected. One of the deputy directors was an agronomist and was responsible for the plant growing and the other was a chief engineer and was responsible for the livestock breeding.

Pasture complexes for fattening calves were established and rotational grazing was practiced there. 300 ha pastures were fenced and plotted and 30-days rotational grazing was done. Calves at 80 kg were taken to the pastures in April and grazed until October when they weighted 250 kg.

Sheep were moved out from the pens in April to the summer folds in the mountain and returned in October.

The village of Ozirovo had a herd of 300 goats as well as a pig farm with 500 sows for fattening.

There was a construction crew of 35 people on the farm that was responsible for the maintenance of buildings and infrastructure within the AIC structure. The other structure was the motor transport brigade with 40 people and 40 trucks for moving and transport of the farm produce. The AIC had 1000 ha of own forests.

The AICs were encouraged to develop some industrial activities as well. Around 300 people were employed in the industrial unit of AIC Varshets. The activities were very diverse.

Overall, the most profitable structures of the AICs were the industrial activities. In AIC Varshets, they provided over 0,5 Million EUR annual profit.

Each working unit and each settlement had a production plan. The produce was sold through the NARcoops – an independent commercial business structure. The meat was given to the RODOPA meat processing structures, lambs were exported at 1,5 EUR per live weight to Italy and Greece by foreign trade departments. The milk was sold to dairies for processing. Manure was transported and sold in Vratsa, while they were buying 2500 tons of grain per year from Zlatiya region (near Danube river) for animal feed.

One animal breeder kept 120 sheep with average yield of 40 liters per sheep.

In the 1980's the structure of the production was revised to more profitable crops. The three main crops were:

- Strawberries - grown on a family chord on 0,1 ha per family. It was allowed to work on the field during working hours. All of the produce was bought by the AIC and the yields reached 30,000 kg/ha.
- Pastures and hay production. The AIC managed 800 ha of meadows and 1000ha of pastures, municipal property, which were mowed for hay. It had a contract with the company for recreation and culture. Each house that accepted tourists had to agree to mow 0,3 ha/year for each tourist in the house. Tourists and guests participated in the gathering hay with their hosts. 2000 tons of hay were sold each year to ships that exported lambs to the Arab countries, Italy and Greece.
- Rosehip was one of the most profitable crops. 800 acres with two varieties of rosehip (Rosa Canina and Rosa Rugosa) were cultivated for the AIC under a contract with the Institute in Plovdiv. The wild rosehip is the most unpretentious plant for this place and weather conditions. It grows on rocky places, it is a permanent crop

Consequences on land use and biodiversity

- The rapid intensification and mechanization that took place in the period did not affect that much the mountain regions and the LA.
- The use of mineral fertilizers for the crop production was typical for the lowlands not on the sloppy and mountainous terrains.
- Most of the local farmers think that the condition and composition of grasslands in that period was better compared to the situation today:
- "There was no need for cleaning the pastures, this was done by the sheep."

Overall, in this period agriculture production in the lowlands was intensified, while the mountainous livestock breeding was still utlizing the available grasslands – pastures and meadows that were in the AICs.
The allocation of land for private use for both fruits and vegetable production and small-scale livestock breeding and the use of mountain pastures in the AICs contributed to the formation and maintenance of the mosaic character of the landscape.

Period 3

- 1990 – 2006
- Transition to market economy and accession to the EU

By the end of 1998, about 80% of the agricultural land was restituted, title deeds were issued for approximately 23% of the agricultural land. Land restitution was a precondition for the development of the private farming sector. However, the private agricultural development was hampered by lack of funds for machinery, seeds, livestock, etc. leading to reduction of the average yields in crop production. This changed its structure by increasing the share of products of high demand - vegetables, potatoes, grain, corn, etc. There was no support for agricultural production at that time.

The cooperatives were de-composed, land was restituted, livestock was allocated the heirs of the LCAH members. Since most of them lived in the cities already, the livestock was slaughtered, and only in rare cases they were sold or kept as subsistence activity. Processing units were privatised and many of them were subsequently destroyed.

Land restitution process resulted in high land fragmentation, followed by massive land abandonment. Many arable lands naturally turned into grasslands. The drastic reduction of livestock led to grasslands abandonment, especially of the alpine and remote grasslands. Municipal lands increased by the so called “residual land”- land that was not claimed hence not restituted to its owners.

EU accession support in agriculture started in 2000. There were many subsistence and small farms but SAPARD programme was focused on medium and big farms (e.g. more than 15 cows) that were considered to be more viable at that time.

Agricultural development in the period


Abandoned grasslands


Abandoned orchards in WSP

- Agriculture Census 2003 data reports 7644 agricultural holding in the LA with an average farm size of 0.3 ha/holding.
- Farms were mainly subsistence and semi-subsistence.
- There were 3,235 cattle and buffaloes, and 22,554 sheep.
- Livestock was grazed on the municipal grasslands mainly near the villages. Municipal grasslands were used as common lands by all livestock owners in the settlements.
- Alpine and remote grasslands were abandoned. Some arable lands were also abandoned thus transforming to meadows and pastures.
- The abandonment of the grasslands motivated some of the current livestock farmers to start their activities to maintain the grasslands.

The accession negotiations that Bulgaria had the EU ignored the reality of the thousands small scale and subsistence farms in the country. The Bulgarian administration was inexperienced or unwilling to make the efforts to adapt the legislation to the farming realities in the country.

The harmonization of the agriculture acquis was focused on the interests of the few large scale producers and processors. This had a very negative effect on the small-scale dairy and meat processing units that existed in the rural areas. The majority of them were closed because of the hygiene requirements and the lack of adequate support to meet them. The closure the local dairy had a detrimental effect on many small livestock farms as they had no systematic local market for the milk. By 2006 most of the small herds were sold or slaughtered.

Consequences on land use and biodiversity

- The drastic decrease of grazing animals led to severe scrub encroachment on grasslands.
- Some grasslands were permanently transformed into forests.
- The closure of the mosaic landscape and thus the loss of specific and conservation important habitats was alarming.
- An initiative to declare it trans-boundary Nature Park has developed. However, a Nature Park « Stara planina » was declared on the Serbian side; the Bulgarian one was proposed as a Natura 2000 area (BG1040 Western Stara Planina and Predbalkan).

There were two trends that were observed in this period:

- The abandonment of pastures, especially the remote high-mountain ones, led to scrub encroachment and natural reforestation on more than a third of the territory.
- The abandonment of arable land, remote and around village, make it possible for local livestock breeders to use it as grazing land. As a result, it turned to pastures.

The identification of Natura 2000 zones in the region (and elsewhere in the country) was carried out in this period, where the abandonment arable land was used as pastures and the abandonment pastured were transformed to forests. Nowadays, many of the land owners of the former abandoned arable land re-convert it to arable, including in Natura 2000 zones. At the same time, the forested pastures are transferred to the forest land category.

Period 4

- Present times

The population of the LA continued to decrease – down to slightly above 35 000.
The villages are inhabited mainly by pensioners, while young people migrate to Sofia or municipal/district centers.
In 2014 the unemployment rate varied between 15 and 35% in the different municipalities in the LA (amongst the highest in Bulgaria).

The schools, medical care and other services are concentrated mainly in the 5 municipal centers.
There are only 2 hospitals (in Varshetz and Berkovitza) and 4 medical centres in the LA.
The kindergartens are 12 with 966 children, half of them are in Berkovitza. There are 17 schools in the LA.
The LA is part of the poorest NUTS II region in the EU.

Almost no diversification of the agricultural activities – although the region has outstanding landscape beauty and is famous for its activities, in 2014 there were only 11 accommodation establishments .

Agricultural development in the period

Scrub clearance to make the land eligible for SAPS support

The LA has 3561 farms –mainly livestock farms, but also mixed farming systems; small and medium farms.

Due to the previous abandonment and the encroachment processes many of the grasslands are not included in the UAA – LPIS layer "Land in good agriculture conditions";

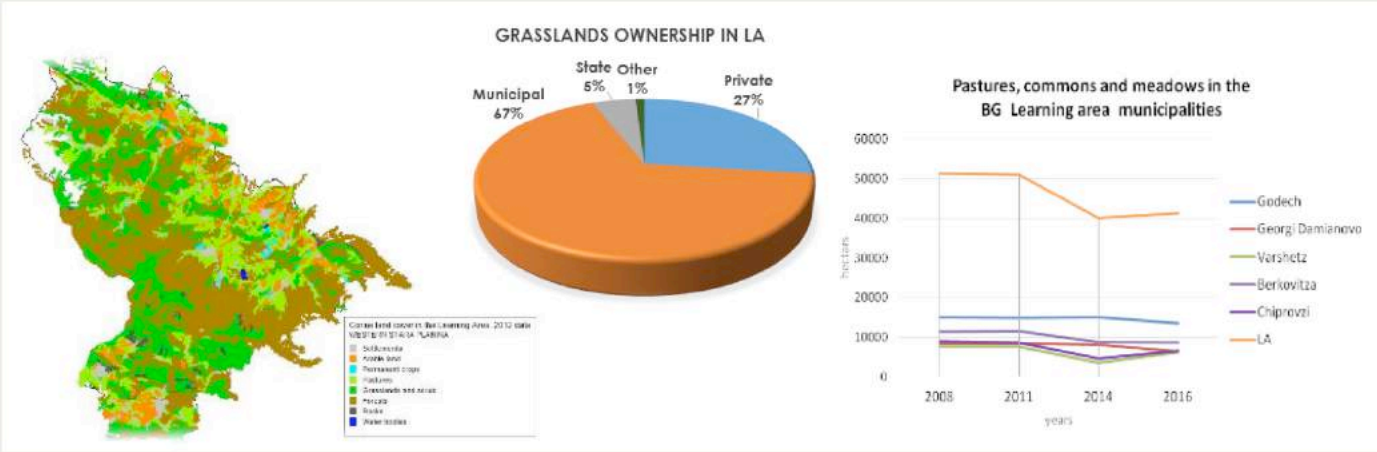
'Subsidy' driven agriculture – most of the grassland are "cleaned" to fit in good agricultural condition by mowing (without real production) and in some cases by ploughing; Easy grazing by horses becomes popular in the LA;

Increased legal and food safety and hygiene requirements – many of the dairy farms do not meet this requirements and are currently transforming to suckler cows;

Direct sales legislation was introduced; farmers markets are organised in the recent years; regional municipal brands are being discussed and piloted;

Small and medium livestock breeders begin to form associations to defend their interests.

Consequences on land use and biodiversity



- At landscape level, the land use is a mosaic of forests, pastures, arable, scrub and rocks.
- The long-term low intensity use has maintained the high biodiversity in the LA, to the extent that in the previous period the abandonment was the biggest threat to open habitats.
- In the current period, the demand for land has increased due to the subsidies, so there is a possibility for strong intensification of the open spaces especially after the loss of around 10,000 ha to forests and/or arable land.

In general the pastures in the region always had some scrub on them, so over-clearing of the "unwanted vegetation" may destroy some of the traditional landscapes. At the same time, the scrub/tree overgrown grasslands are very expensive to re-open.

The majority of the grasslands are public – municipal and state, and historically were used as common pastures in a tradition system. In the new period this has changed, due to the need to have a legal right to be able to claim CAP subsidies. As a result, the old system for truly common use of pastures has in practice disappeared. Instead, the municipal grasslands are allocated for individual use. Priority is given to farmers from the same settlement/municipality who must have grazing animals. The allocation ratio is determined in a state regulation (for high productivity and low productivity pastures) to prevent misuse of the public grassland.

A negative consequence of this is the impossibility to consider the pastures' carrying capacity in the allocation process, because of the legally set ratio of number of animals per hectar of grassland. The effects on the biodiversity from the transition from common to individual pastures use is still not accessed. The Bulgarian Society for Protection of Birds (BSPB) recommends to maintain the pastures by grazing and mowing and minimize the use of shredders (cutting machines) in order to maintain the high nature values of the area.

The business as usual scenario

- Where do we go in 2030 in the current situation?

The geographical location (near Sofia), the natural features (especially the mineral springs in Varshets and Godech) and cultural heritage create prerequisites for development of various forms of tourism - rural, cave, biking, spa, hunting, cultural, religious and others. However, the restructuring of the ownership of tourist facilities in most resorts and complexes was made by people unfamiliar with the tourist business. Poor coordination between the new private owners, state and local governments, financial instability and small economic incentives from the state further worsened the situation in the tourist sector. New initiatives are emerging and there are some trials in developing tourist products between the different municipalities in the LA (Varshetz, Godech, Berkovitza).

Four municipalities of the LA have local action groups (LAGs) and have developed strategies for community led local development:

The strategy of the LAG Berkovitza-Godech (2014-2020) is approved for implementation and includes measures from the EAFRD. Its strategic objective is to make the territory a dynamic rural area with improved quality of life by promoting entrepreneurship and efficient use of local resources.

The strategy of the LAG Western Stara Planina (Chiprovzi, Georgi Damianovo, Chuprene, Rujintzi municipalities) has already undergone public hearings and has to be submitted for approval in the next call for proposals. The strategy includes measures from EAFRD and Structural funds (Operational programme Environment (EFRD) Operational programme Human resources development (ESF), Operational programme Innovations and competitiveness (EFRD). Its strategic objective is improving the quality of life and competitiveness of the local economy and ensuring a balanced and sustainable local development through more employment opportunities and social inclusion, implementation of integrated measures for business development and entrepreneurship, construction and renovation of social and cultural infrastructure and conservation and promotion of local identity, cultural and historical traditions, environment and biodiversity.

Neither of the LAGs builds its strategy explicitly on the HNV characteristics of the territory. The analysis and strategies development were outsourced to consultancy companies from outside the region, which could be one reason that HNV values are not integrated. Another reason is that for municipal authorities HNV farming as it exists today is not a basis for development, but a remnant of the past.

Varshets municipality does not have a LAG since its population is less than the requirements for registration. The vision

The economic driving forces Food chains and market

- Main driving forces for agricultural development:

- National and EU support schemes, since the market income is insufficient to continue the livestock breeding activities;

- The development of tourism activities and the increasing demand for quality food products is a niche for the future development of the LA. There are already some initiatives of local brands and direct sale to final customers and restaurants in the area. Even if small scale still, they provide perspectives for the future.

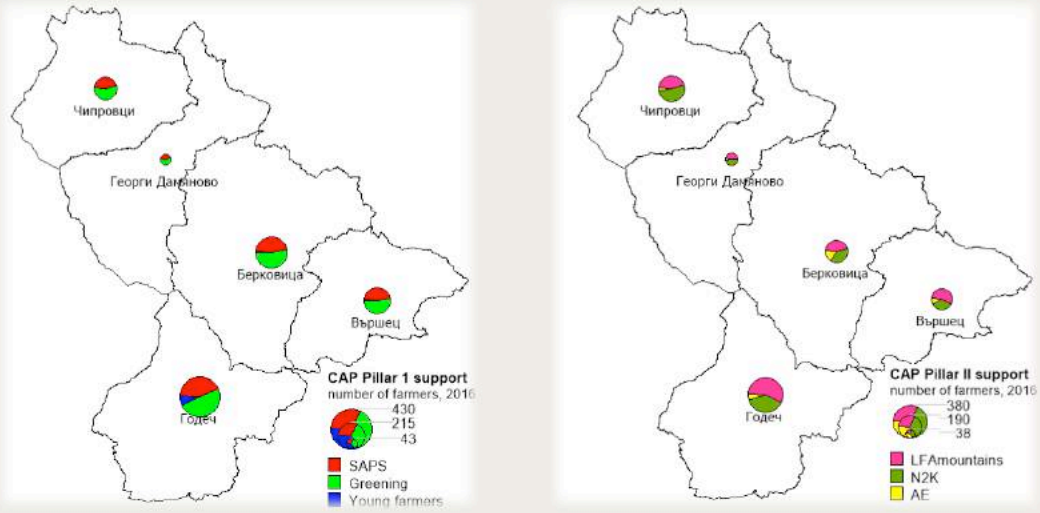
- Main limiting factors:

- Aging of the labour force: In 2010 over 46% of the LA farmers were over 64 years old and 26% were between 55-64 years.

- Governance and rules for allocating municipal grasslands – setting up fair rules supporting local livestock breeders.

- Limited investments both in on-farm processing units and tourist infrastructure.

The policies and political driving forces



- Main measures that impact the HNV farming systems:
- SAPS support and greening payments.
- Coupled payments for livestock and for fruits, vegetables and protein crops.
- LFA payments for mountainous and other areas.
- Natura 2000 payments depending on the management restrictions for grassland.
- Agri-environmental payments: restoration and maintenance of HNV grasslands

The programs and financial instruments for the implementation of various policies are planned at national level - policy for rural development, regional policy, human resource development, economic competitiveness, environment, climate change and biodiversity conservation. All programs and policies give priority to financing projects in the territory of northwestern Bulgaria, where the LA is situated.

The implementation of various policy measures for rural development also has an essential role for the agricultural sector and the improvement of services and life in rural areas. There are a number of already implemented investment projects in the LA for modernization of farms, introduction of new technologies and production processes, training of farmers, creation and modernization of processing capacities. Measures for improvement of the age structure of farmers are applied and starting aid for setting up young farmers and small farms is available. Such support is particularly important for the local communities in mountainous regions where there are no opportunities for credit and financial investments in agricultural activities.

Coupled payments are provided for dairy cows; suckler cows and heifers; ewes and she-goats and buffalos. Support for dairy and suckler cows and ewes and she-goats that are registered in breeds' registers is higher. Coupled support is offered also for fruits, vegetables and protein crops.

(continuing...)

Natura 2000 measure is designed for sites with designation orders in force and where there are specific restrictions on agricultural land use. The payments depend on the restrictions that are listed in the designation orders as well as the geographical situation of the site. For grasslands the payments vary between €17 and €108/ha. Payments for Natura 2000 sites in ANC are lower than the areas that are not designated as ANC (the assumption being that the loss of income is lower).

The commonest restrictions for grasslands in Natura 2000 sites are:

- Ban on the removal of landscape features (hedges, single and group tree)
- Prohibition of mowing before 1 July
- Prohibition of ploughing and afforesting meadows, pastures and commons and turning them into arable land and/or permanent crops.
- Prohibition on the use of pesticides and fertilisers in pastures and meadows.
- Prohibition of mowing before 15 June or 15 July (depending on the region) from the periphery to the centre with fast-moving technology.

The commitments under Natura 2000 measure are annual, so that many farmers prefer to apply for that measure rather than undertaking a five-year agri-environment commitment. However, payments under Natura 2000 measure are lower than those available in the HNV AE scheme.

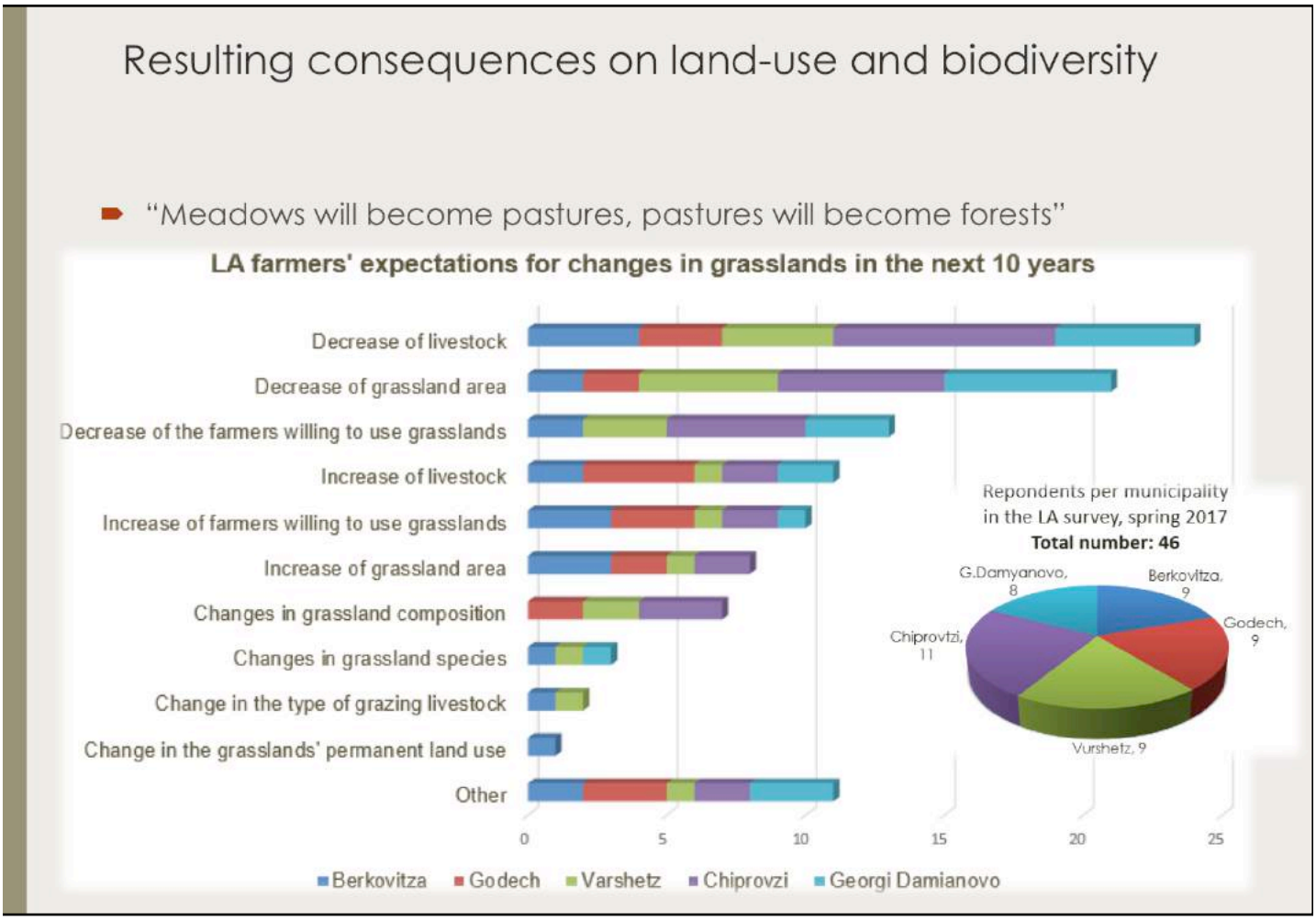
Agri-environmental payments

The Restoration and maintenance of HNV grasslands scheme is applicable to all grasslands in the HNVF layer throughout the country. Farmers' commitments are for a minimum period of 5 years and every year they declare whether the grassland parcels would be mown or grazed.

The payment rate for mowing is €113.15/ha and the management requirements comprise prohibition on the

The main problem for the area is rapid depopulation and aging population and lack of a qualified working force in agriculture. Therefore, we believe that there is no threat of intensification in the area. Even if the livestock continues to increase with the same speed and levels it will not reach the numbers from the past when the grasslands were maintained by the grazing animals. The lack of labour force (especially shepherds) is leading also to changing the grazing livestock practices into indoor breeding farm enterprises.

The direct sales registrations in the LA is due to the support provided by a 5-year project implemented by the Bulgarian Society for the Protection of Birds and other NGOs in Bulgaria, funded by the Swiss Development Cooperation. The support was both financial, technical, and advisory to help farmers go through the process.



The survery was carried out in early spring 2017 in the municipalities of the LA. The number of respondents is 46. Over 60% of them stated that grasslands were important for their livestock, although the livestock farmers were 50% of all (there were also some hobby and/or subsistence livestock owners). The other respondents comprised representatives of agricultural offices and municipal authorities, NGOs, processing and other businesses.

The expecations of local farmers for the changes in the grasslands in the next 10 years vary in the LA. The farmers from the two more remote and smaller municipalities – Chiprovtzi and Georgi Damyanovo expect a significant decrease in the number of livestock and grasslands. They have less hope for an increase in the livestock farming. Comparing their expectations to the CAP subsidies received, we observe that they already have a decrease in the numbers. Of course, there are also farmers believing in the opposite trend in these municipalities too.

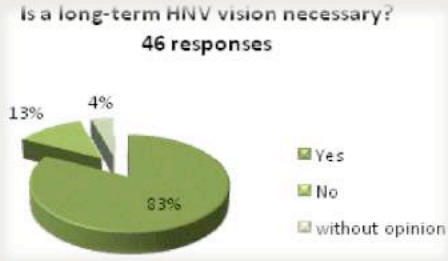
The farmers in the two municipalities with highest numbers of supported farmers – Godech and Berkovitsza are split in their expectations for decrease/increase trends. These are also the municipalities in which young farmers were supported and there is more hope in them.

Overall, the farmers in the LA fear that if livestock support does not continue, the consequences for the pastures and landscape will be negative.

The HNV vision

- Managing biodiversity landscapes for a vivid society

Biodiversity-rich landscapes: how will they function in 2030?



- Vision: Agricultural modernization taking into account natural and cultural heritage in the region
- Farming activities and production methods reflect the specificities of the LA: pastoralism, maintenance of the landscape and nature values, protection of natural sites and protected areas, but also HNV farmland outside the protected areas; all farmers have access to grasslands near their farms. Long-term contracts for municipal pastures. Forests and grasslands routes and watering places are restored.
- Farmers (medium-size, family farms) are well informed, open to novelties providing better biodiversity conservation, using appropriate equipment, applying new technologies.
- Cooperation and interaction between all stakeholders to increase social cohesion, rediscovery of local traditions and events that lead to joint initiatives for promoting and marketing local products: local brand, direct marketing and direct contact with consumers, better promotion and services linked to tourism development.
- Stable and understandable legal framework and flexible administration both at local and regional, and national level.

The vision presents integrated economic, social and environmental development of the region. The farms' production is in compliance with the natural conditions of the region respecting local traditions and applying environmental, natural processing/canning/packing/drying etc. methods. Production is organized in small and medium facilities available and affordable for the farmers' capacity in the region.

Provision of appropriate specialized training for agricultural producers and local community (raising awareness on the nature conservation, better practices and technologies, administrative and legal obligations, utilization of the opportunities for self-sufficiency in food, energy and others (solar panels, composting systems, etc.).

Cooperation and interaction (mutual, informal) between all of them increases social cohesion; rediscovery of local traditions and events. The joint activities could be supported by a network of sectoral associations, unions, etc.

There is a stable and understandable legal framework and flexible administration either at local and regional and national level.

(continuing…)

Local stakeholders want to see the following elements in the vision:

•Increased number of animals both cows and sheep (extensive/traditional grazing and livestock breeding); diversification of the animals, e.g. buffaloes.

•Long-term contracting about pastures and meadows for common use (owned by the public authorities); to be rented on the basis of long term contracts.

•Consolidated and proper land management (improved grass cover and grassland productivity where the balance between restoring abandoned grasslands and extensive management of grasslands needs to be closely monitored); rotational grazing (control over the density of the animals and duration of the grazing on one place); control over / stopping non-nature friendly agricultural practices (pesticides use, burnings of stubbles and pastures) etc.), no abandonment, no ploughing up of Natura 2000 sites and the pastures and meadows.

•Maintenance and reasonable use of infrastructure – water sources (facilities), forest/fields roads/paths (ensuring the access to pastures for the livestock) etc.

•Complex preservation of natural resources and biodiversity following good practices: specific mowing periods applied for Natura 2000 areas, as well as innovations as electric fences (other equipment e.g. mobile dairy facilities, manure handling etc.)

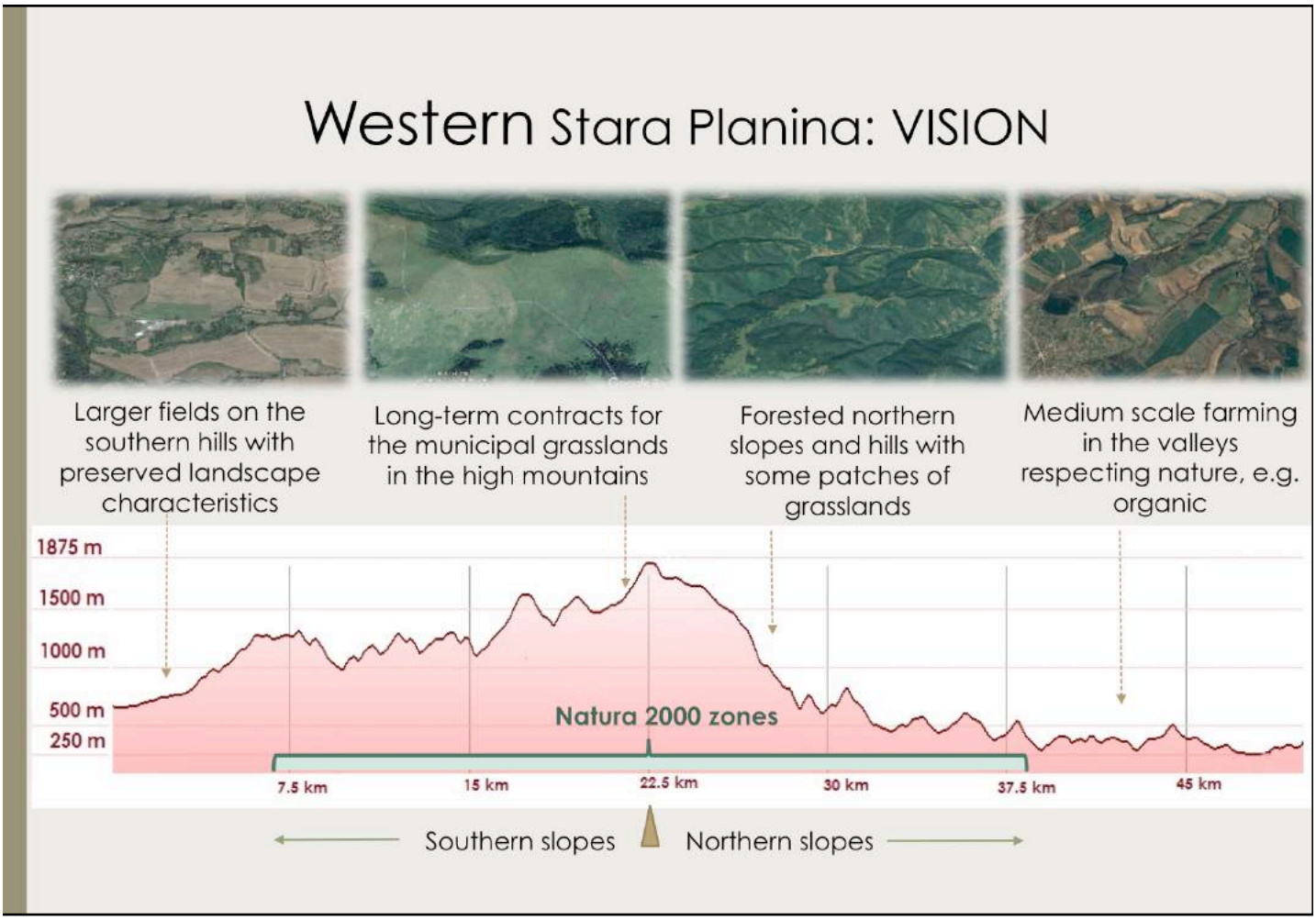
•Diversification of agricultural practices and activities – transition to organic farming; oil extraction from juniper; tourism (rural); interactions with foresters.

•Better educational and training activities even organized by the farmers and locals, better communication (e.g. set up regional forum etc. for experience exchange, consultations); youth activities, including young farmers exchanges

•EU subsidies arranged to support real farms (the species and number of animals to be determinant factors)

•Primary processing and direct sells (either farmers' markets and regional stock exchange); cooperation (producer organizations); certification (local identity and marketing; grazing farming products; HNV is still not recognized as a label)

•Institutional stability and informed local administration with direct contact with the farmers; understandable and durable legal acts; consistency between different policies: agricultural, food, credit etc.; regional strategies and programs; community actions for pastures cleaning and preservation (local waste management).



- **Medium scale farming in the valleys respecting nature**

The medium-scale family farms respect the semi-mountainous relief and natural conditions. Some areas are still used for cereals, others are vegetable gardens and orchards. The need to sustain income for families requires better farm management. Organic farming spreads to other production systems (not only strawberries).

- **Forested slopes with patches of grasslands**

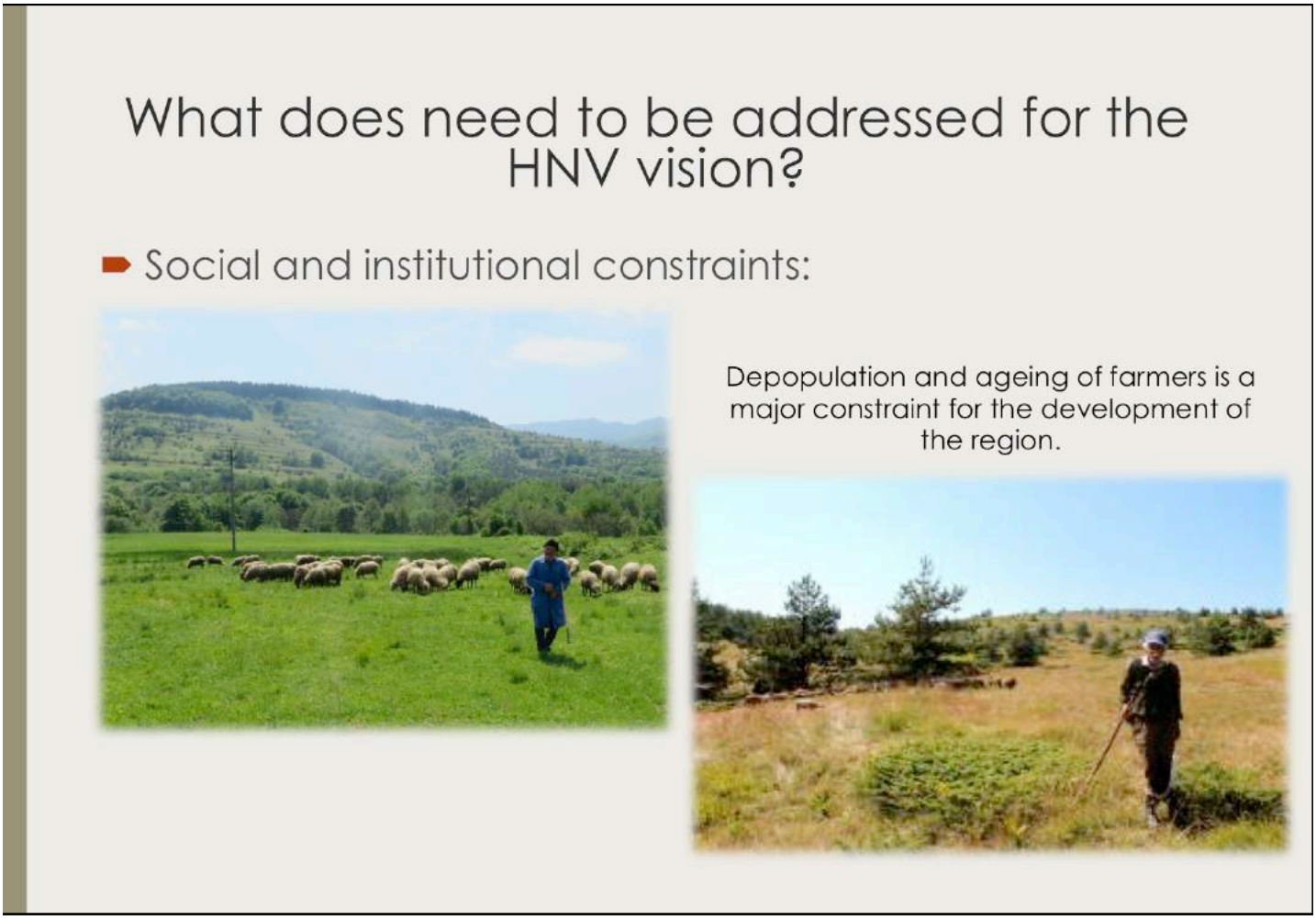
Forests are likely to increase, so forestry continues to play an important role. The small arable patches are likely to disappear with the reduction of small farmers. The patches of grasslands that are likely to sustain are those natural (primary) grasslands (alpine or high mountain pastures, riparian meadows, stony and rocky terrains) that do not depend on human activities.

- **Common grasslands in the high mountains**

The contracts for individual use of municipal pastures are longer (minimum 10 years) to allow farmers to invest in shelters and watering points for the livestock.

- **Larger fields on the southern hills**

The relief on the southern hills allows to form larger arable fields, which are used for growing cereals, maize, rapeseed, etc. Nevertheless, the landscape features and characteristics such as field boundaries, forested patches, are preserved and maintained.



The municipalities of the LA are in the lists of underdeveloped areas ever since 1982 so the challenges are long-standing:

-Depopulation and aging population.

-Lack of labour force/shepherds; migration of working age population

-Lack of interest for agricultural activities; no continuation between generations (the work load is too high; most of the HNV operations require manual work);

-Limited cooperation and support between farmers and administration;

-Insufficient information to farmers.

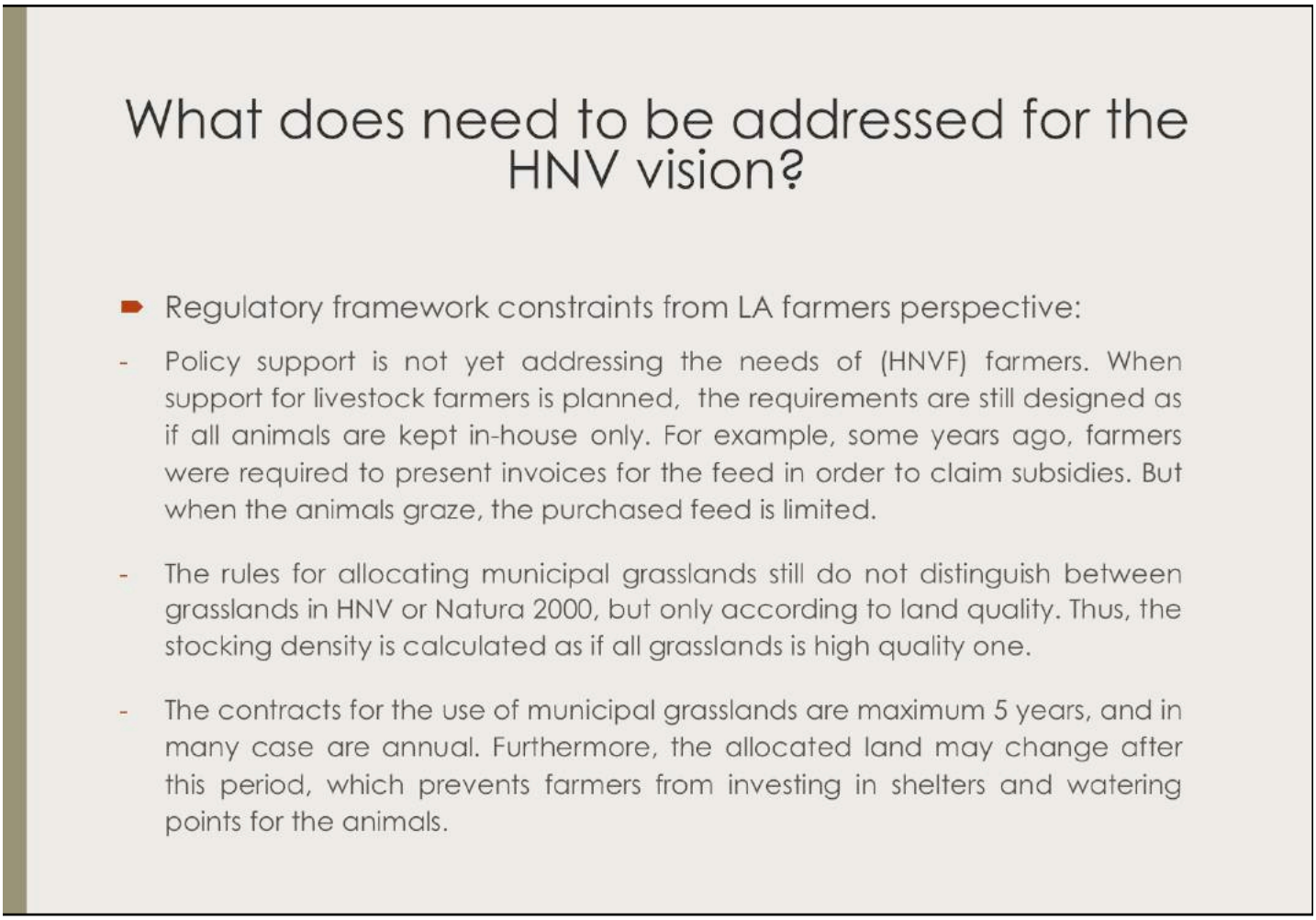
-Poor infrastructure and services.

-Insufficient studies from (collaboration with) research/education institutes on the production techniques, economy, environmental protection on the farm.a

-Poor quality of rural life - the overall situation in the region and its image as the most underdeveloped region in the EU

The LA nowadays seems to have three centers for potential development, the three towns – Berkovitza, Godech and Vurshetz. Two of them work together in a local action group to make the territory more viable. Vurshetz has its focus for development as a spa territory. Chiprovtzi is the most distant municipality but has the famous Chiprovtzi carpets. Looking at the territory from afar it seems it has the main strongholds for viable development.

However, the depopulation of the territory is the main barrier for its development. The high share of unemployed people (15%-35%) indicates a problem with employment opportunities. However, the problem in the region is deeper than that. Many people in working age got used to the (low) social security payments and are unwilling to get a job that demands them working. Livestock farmers in the LA complain that despite the relative high salaries they offer for shepherds/herders they still have problems hiring reliable people. This forces them to keep flock/herd sizes that they can care of with their family labour only.



The frequent changes in the legislation and support measures/levels are one of the biggest problem for livestock farmers. It not only prevents them from longer planning of the farm's business; but also puts them in demanding compliance situations. The procedures and rules for farmers have to be simplified, which requires coordination between different instruments: support mechanisms, advisory services, subsidies, etc.

The support for livestock breeding is insufficient in comparison to arable farming. Coupled support for livestock farmers was only introduced in the last couple of years which was a life-saving injection for the sector. However, the coupled support will not continue for long, hence the overwhelming farmers' expectations for the decrease of livestock and livestock farmers in the next 10 years.

What does need to be addressed for the HNV vision?

- Product and market constraints
- Direct sales legislation has improved, but still needs to be more flexible and to include also plant products
- Organized farmers markets are only in Sofia and very big cities
- Lack of processing units and bureaucratic procedures/checks
- Farmers do not possess enough knowledge and skills for direct sales, direct contact with consumers etc.
- A regional brand for the territory is discussed for some time, but requires dedicated action, skills and cooperation.

Farmers' market
"Food from the Balkan"
Traditional products from Western and Central Balkan
Saturday 9.00 – 14.30

It is only in the last 5 years that the Bulgarian public administration started considering the option for small scale production and processing on the farms. The first ordinance regulating it was adopted in 2010 with many weaknesses. It has been changed/imporved several times since then. There are around 70 on-farm dairy processing units officially registered in Bulgaria and 10% of them are in WSP (around 3% of Bulgarian territory).

The simplification and streamlining the legislation and controls for direct sales will be highly beneficial for the local farmers who are exploiting this development opportunity.

What does need to be addressed for the HNV vision?

- Farming techniques and technologies:

- Abandonment (especially in mountain areas), mountainous terrain that do not allow standard mechanization
- New technologies and techniques that take into account Natura 2000 requirements are limited or do not exist
- Limited choice of (knowledge about) products for plant/animals protection/ prevention/treatment tailored for HNV farming practices
- Nature friendly technologies for removal of bracken and juniper

Actions and understanding of all stakeholders both in and outside the region are needed:

- ✓ HNV farmers, including young farmers and innovators,
- ✓ public bodies and NGOs,
- ✓ agriculture advisory services, local administration (municipal authorities),
- ✓ state administration (starting from their representatives at local level),
- ✓ consumers, society

should combine their efforts for the sustainable development of the LA.

Selected Reference List

- This presentation is based on a large number of books, reports, articles and web pages, few of which are peer-reviewed.
- The list below represents only a selection of the material consulted in printed or pdf format.

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A thematic network on High Value Farming
Learning, INnovation & Knowledge

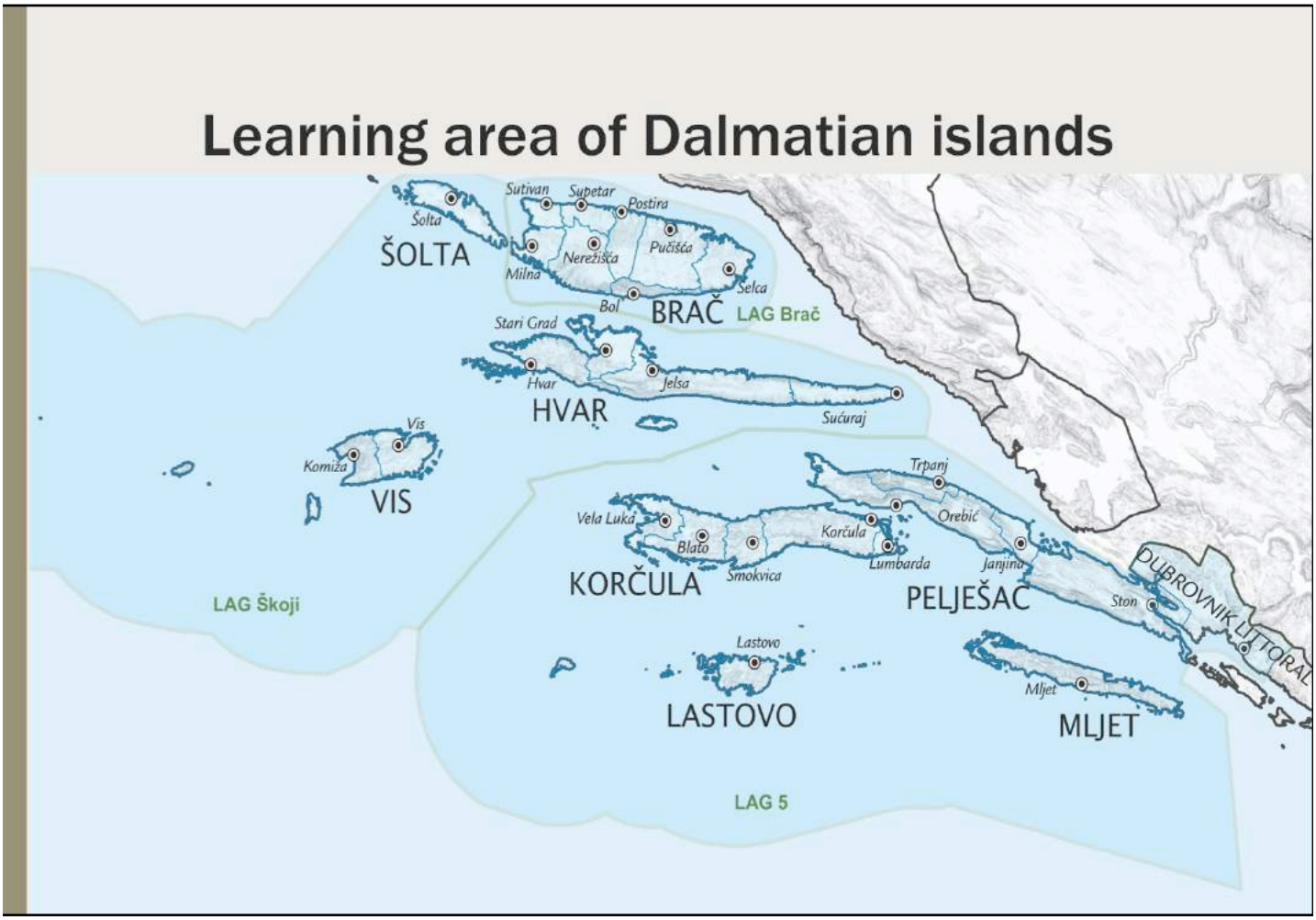
LEARNING AREA « DALMATIAN ISLANDS » (Croatia)

A BASELINE ASSESSMENT

Authors: Ivana Botica, Josip Grgić, Vinko Muštra, Slađana Pavlinović, Marija Roglić, Blanka Šimundić

Date: June 2017

This project has received funding from the European Union Horizon 2020 research and innovations program under Grant Agreement No. 696391

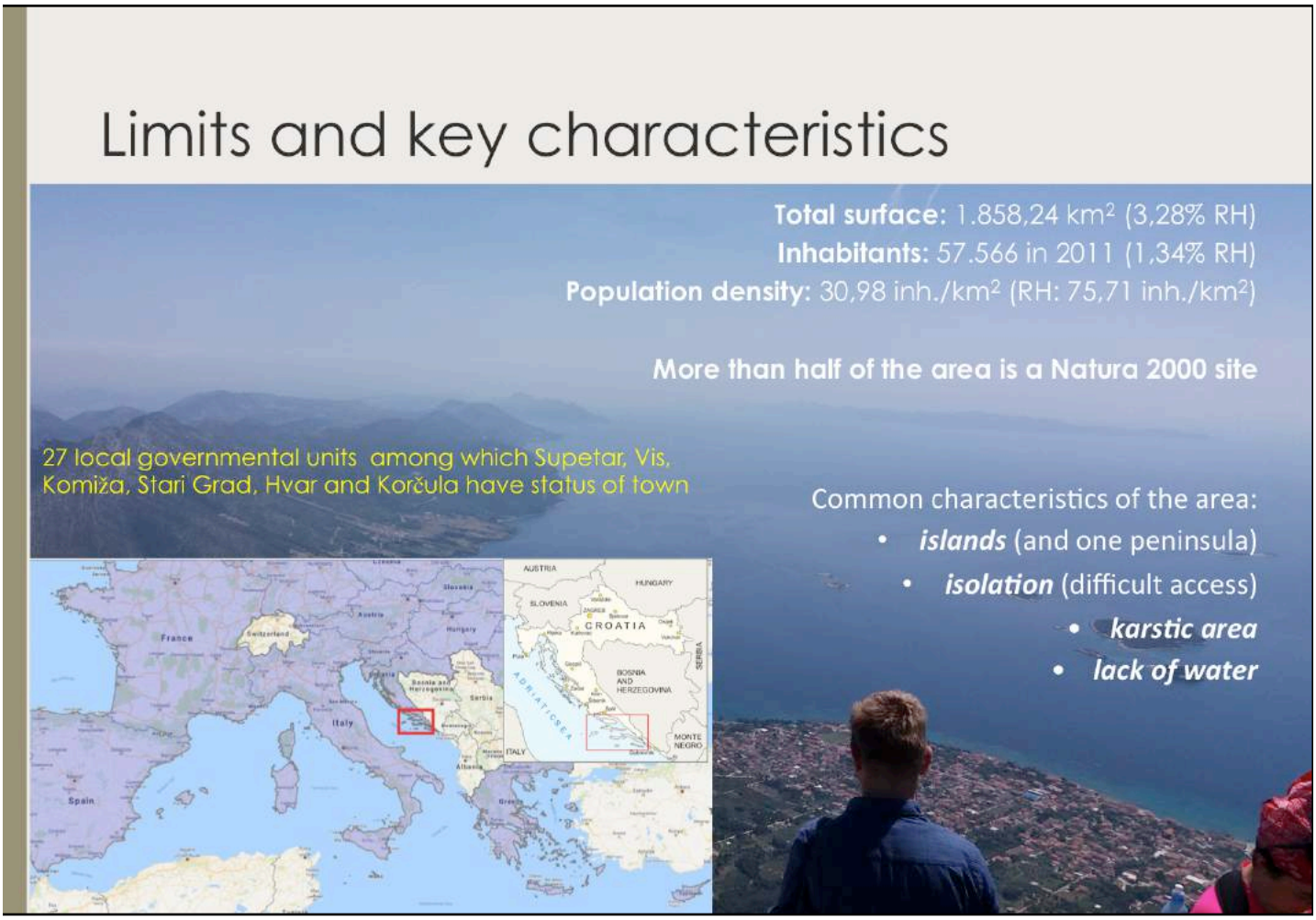


A portrait of the Dalmatian islands Learning Area (LA)

The learning area of Dalmatian islands covers the territory of three local action groups LAG Škoji, LAG brač and LAG 5 situated in central and south Dalmatia in the Split-Dalmatia and Dubrovnik-Neretva region. Specifically islands of Brač, Hvar, Šolta, Vis, Mljet, Lastovo, Korčula, Pelješac peninsula and the Dubrovnik West Coast municipality. More then 80% of the area is Natura 2000 sites, encompassing one National Park ''Mljet and Nature park ''Lastovo islands'' as well as many nature protected landscapes. The area is highly touristic due to its natural and cultural heritage.

This territory (185 824 ha) is characterised with a predominant HNV type 2, which consists of a mosaic of low intensity farming namely composed of small fields of arable plots, vegetable gardens, orchards and vineyards, usually on stone wall (AgroParistech, 2017:13). Therefore the whole description of the LA we here provide, is structured around the mosaic agricultural landscape that despite the fact that today it represents only 5,75% of the officially cultivated agricultural land, it has a significantly higher importance in terms of biodiversity, preservation of natural habitats and long term sustainable tourism activity as the major economic activity of the entire LA.

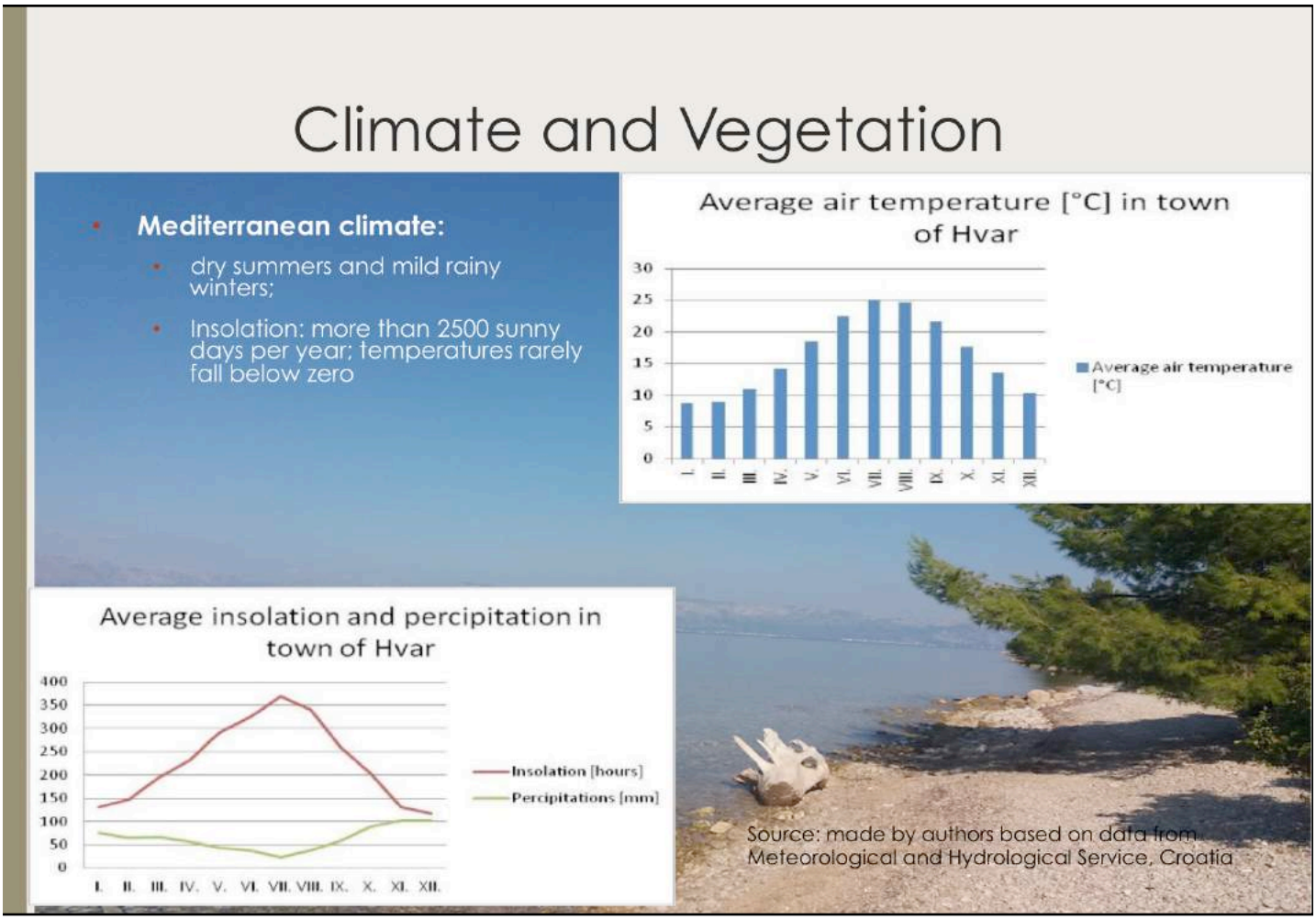
Photo credit:
Selca, Brač (source: Jakšić, K.)



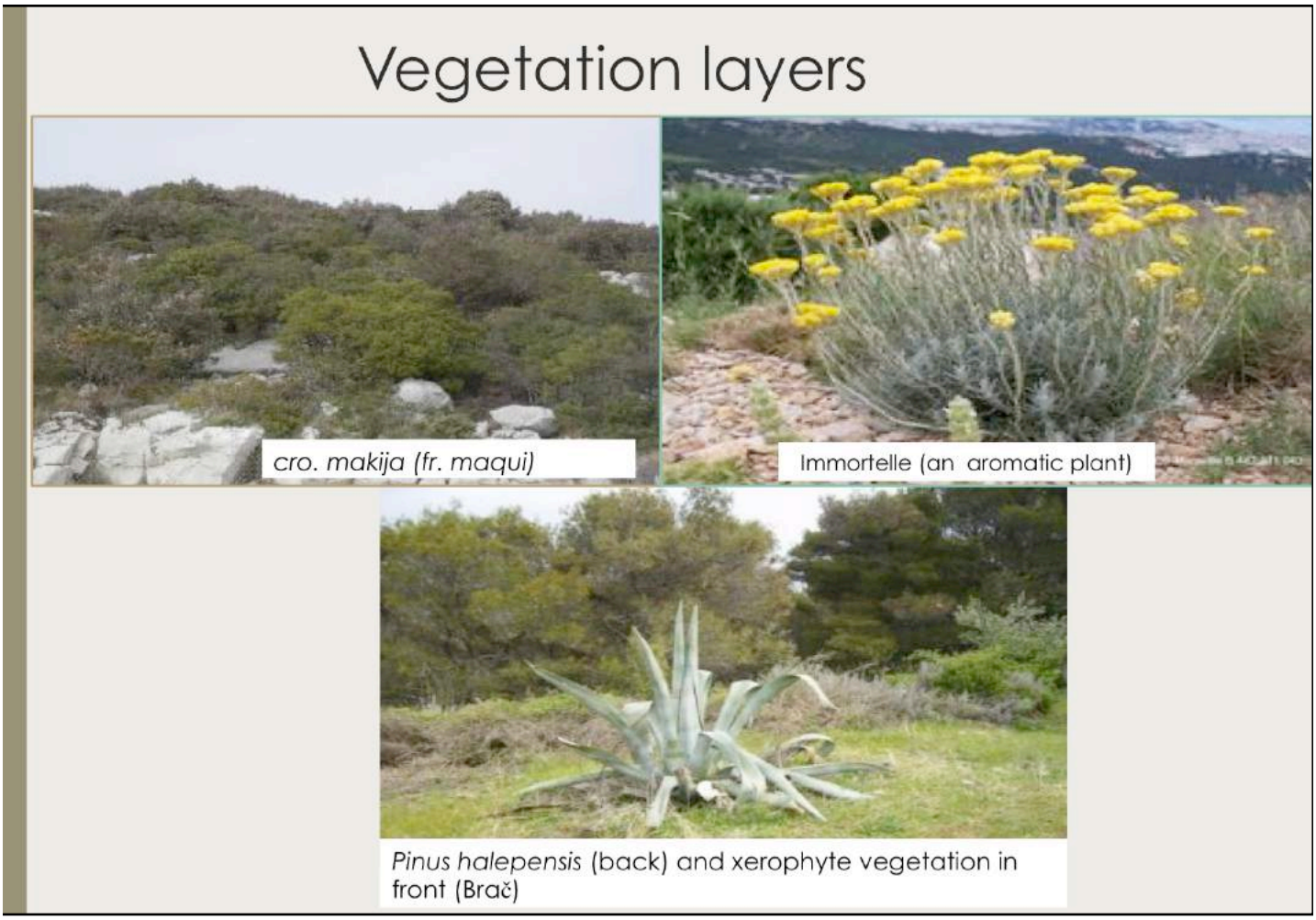
Limits and the key characteristics of the LA ''Dalmatian islands''

The LA ''Dalmatian islands'' is formally encompassed by official borders of 27 local governmental units (LGUs). 15 LGUs are belonging to Split-Dalmatia County while remaining 11 LGUs belong to Dubrovnik-Neretva County. In the LA there is a total of 57 566 inhabitants and the population density is 31 inh./km2 that is well below the national average that is 76 inh./km2. The average size of a parcel is 0,27 ha and there are more than 6 295 small scale family farms in the area. The area is characterised by a continuously decreasing population, small-scale agriculture and on some islands micro and on some islands small-extensive livestock farming.

The diverse landscape is composed of different types of land cover that are quite differently spatially organized. The majority of the islands is covered in guarrigues, macchias and Pinus halepensis. Agricultural landscapes differ from island to island with the overall typology being internal and coastal hills, coastal slopes and karstic plains. The HNV type 2 to in the LA is seen through the presence of semi-natural vegetation and understorey, the land use and farming practices that foster biodiversity, and the presence of a landscape mosaic at a broader scale (Abdessater, 2017:50). The landscape is defined by its components and their position in relation to the landscape (ager: cropped land; sylva: woodland; hortus: gardened land; saltus:uncultivated land) that are elements characteristic in all of the learning area islands. Its specificities on the scale of the island are seen in the distribution of agricultural practices where some of the island have predominant olive groves semi-natural habitats, some vineyards, some small scale livestock (Beug, 1967; Krklec et al, 2011).



The LA area according to the Koppen climatic classification belongs to several basic types of the Mediterranean climate. Open islands such as the archipelagos of the island of Vis and Lastovo and the southernmost part of Korčula belong to the semi arid or ''olive'' climate covers that are characterised by pronounced heat and dryness, while precipitation comes only in the coldest parts of the year. True Mediterranean climate is one the nearer islands and the Pelješac peninsula. It is similar to the semi arid but has much more rainfall (Ozimec et al, 2015:33). In line with climate conditions, dominant agriculture consists of citrus fruits, olive trees and vineyards.

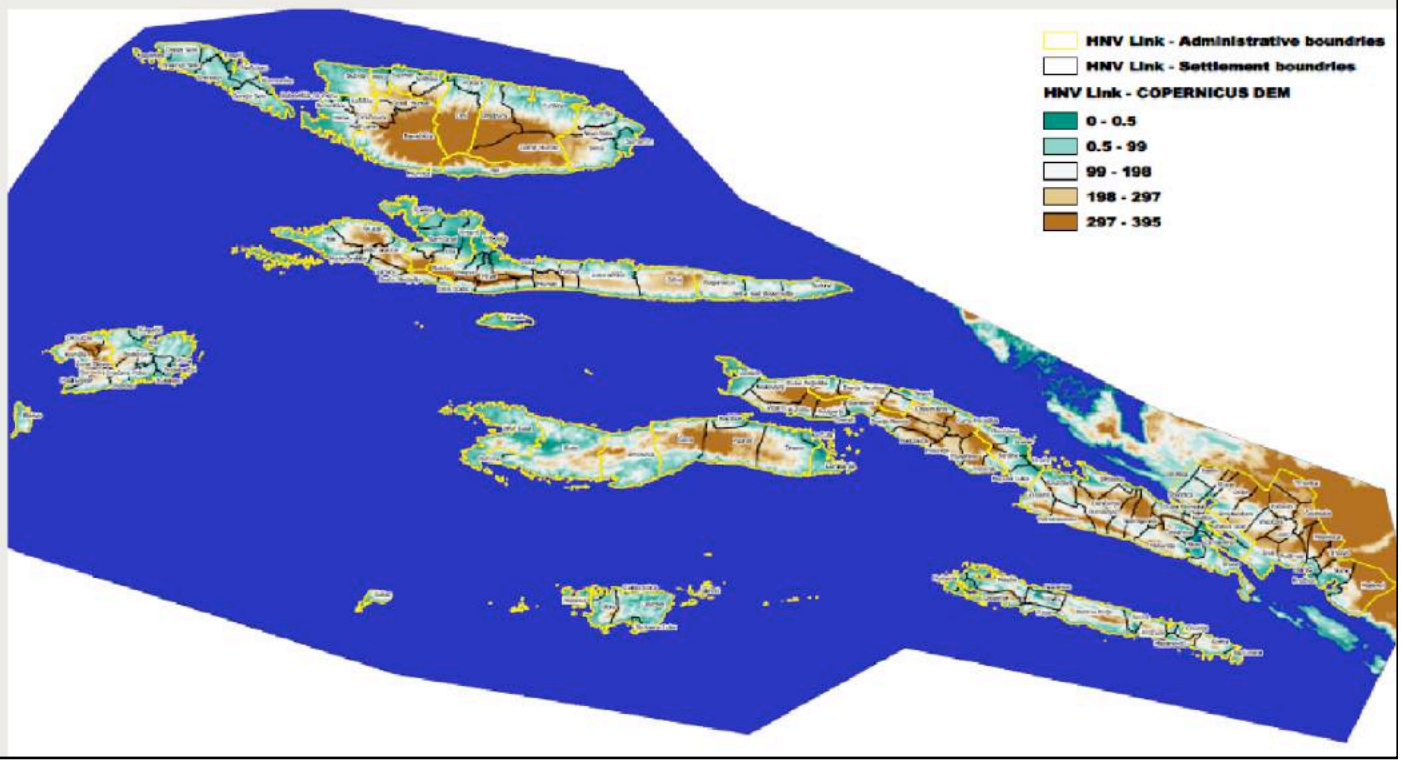


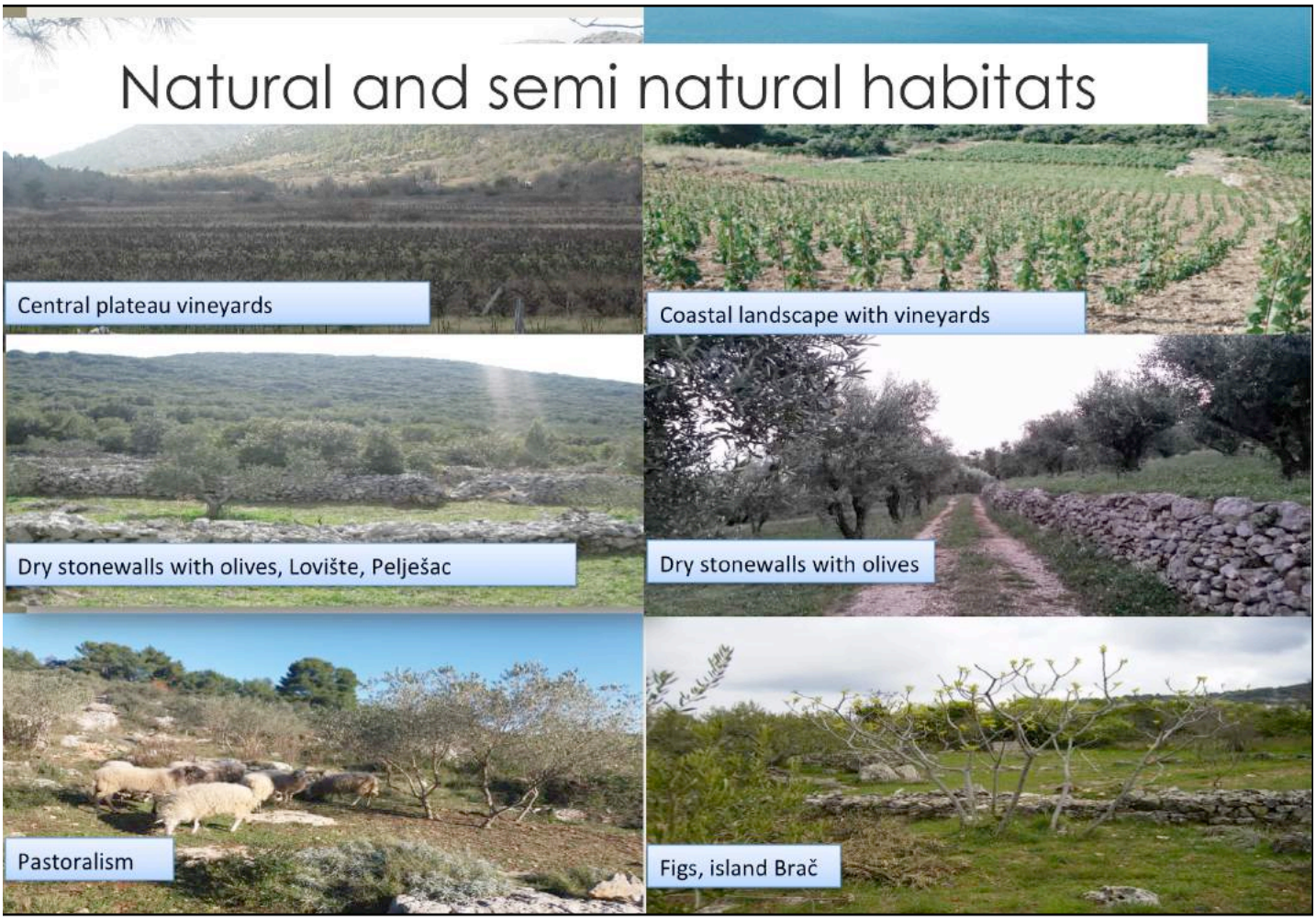
Three types of vegetation (Defilippis, 1997:28):

- "makija" – impassable dense holm communities
- garigue – evergreen shrubs, low trees, aromatic herbs, and bunchgrasses found in poor or dry soil
- *Pinus halepensis*

Until deagrarisation of these areas in 50-ies, impact of man on pasture and forest area was very significant. Wood was the only energy source. It was used for heating, cooking, and for construction. Huge amounts of wood area used in production of lime (high temperatures). Wood is cut to feed animals, and goats eat small trees preventing their growth. Energy and construction substitutes, as well as deagrarisation, led to autochthon forest regeneration (Defilippis, 1997).

LA Dalmatian Islands relief



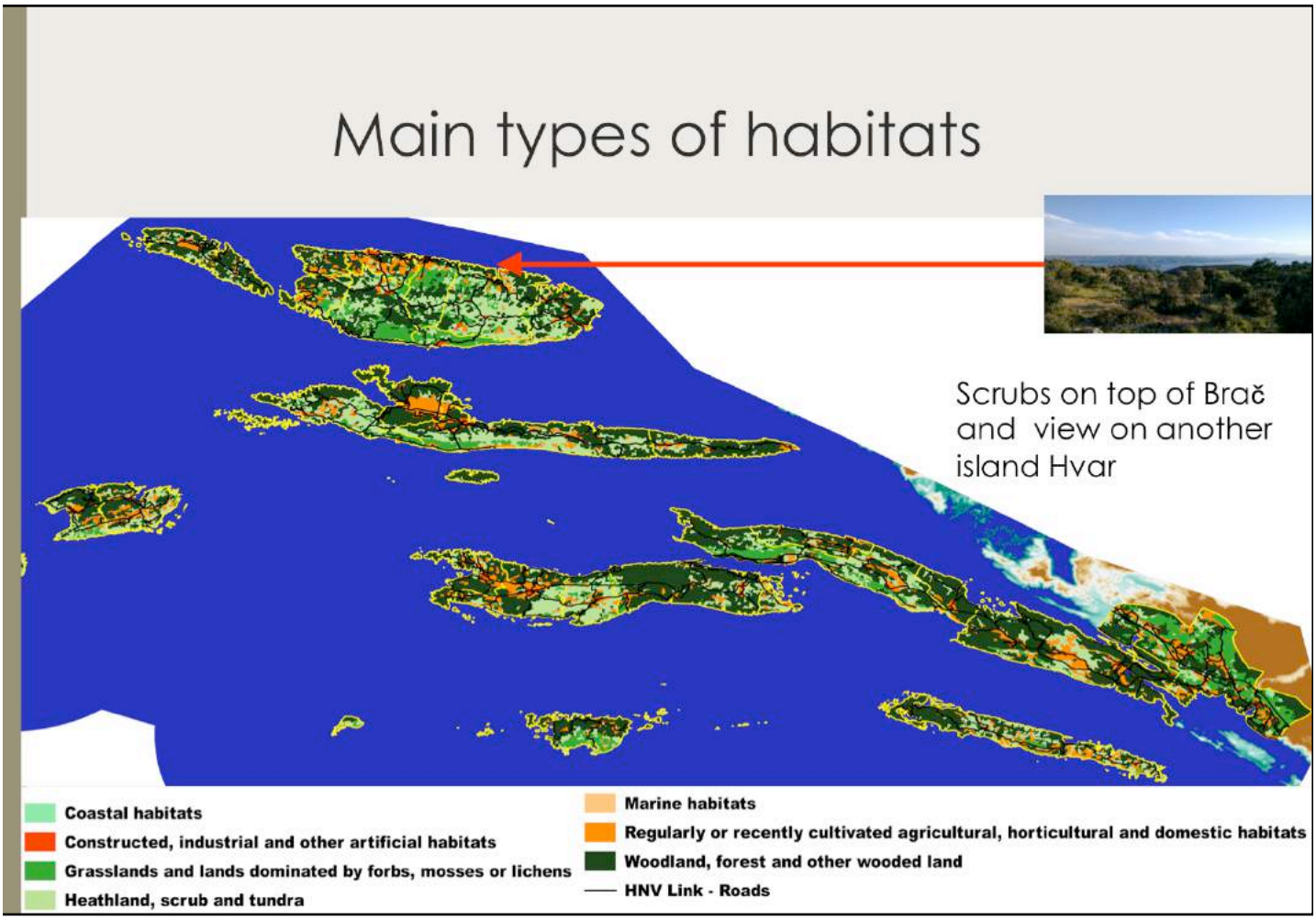


Three types of landscapes can be found in the Dalmatian Islands:
a) karstic fields (flooded due to eroded surrounding hills)
b) terraces on slopes (typical man-made landscape; erosion prevention measure which was a result of the labour surplus and cultivable land shortage)
c) karstic pastures (extensive pasture; scarce xerophyte vegetation)

Due to the shortage of natural arable land in this karstic area, very sensitive landscape in Dalmatian Islands is a result of a longlasting efforts to create additional arable land and prevent erosion by cleaning stones and building stonewalls.

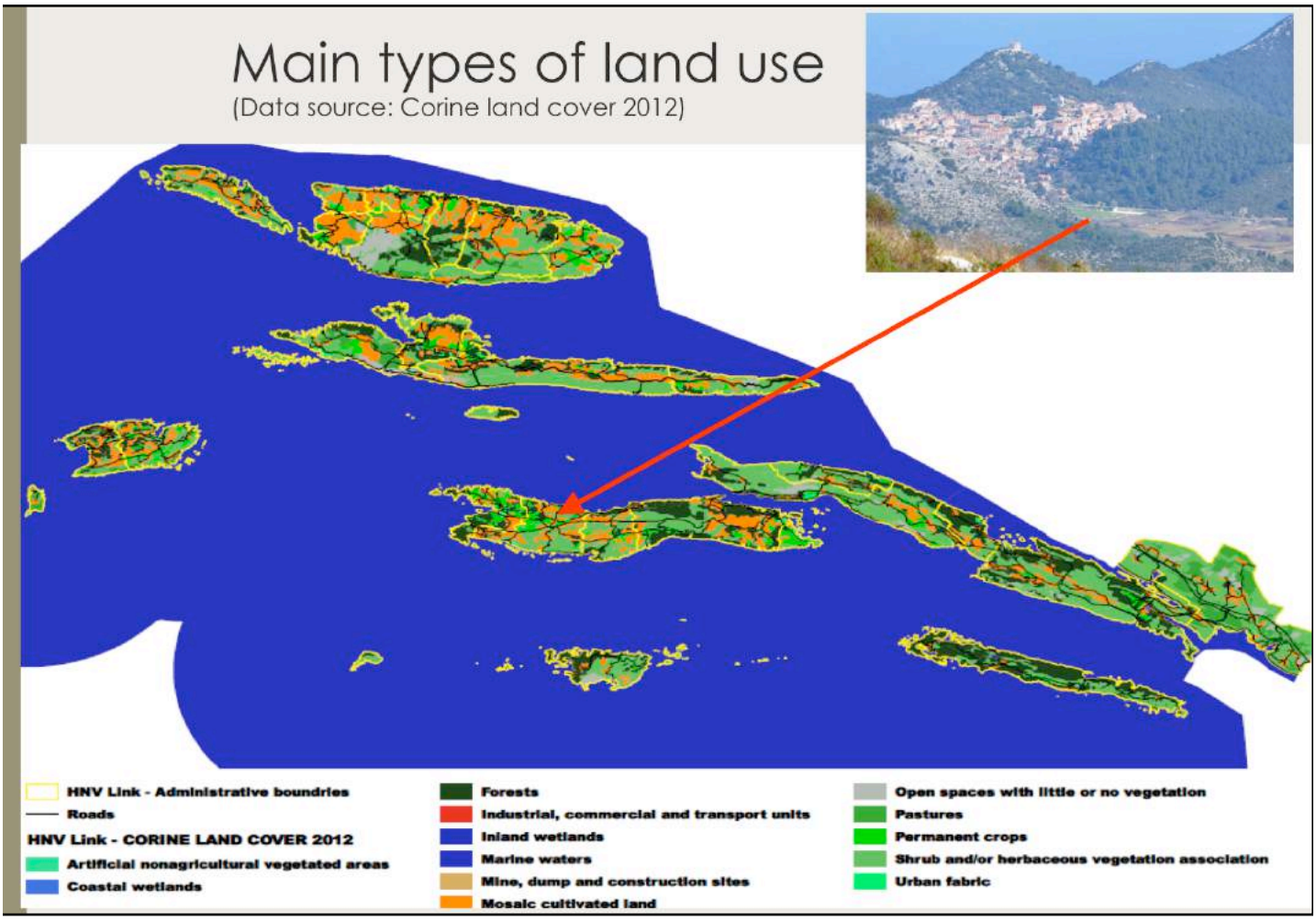
Erosion prevention is very important aspect of water management in a karstic area. It is necessary to apply measures which will prevent soil erosion from the bare, stony slopes and its relocation to the karstic fields. If slopes are covered with vegetation, water drains capillary and gradually. In this way floods in karstic fields and further slope erosion are avoided, and soil and vegetation on slopes are preserved.

Credit photos: LAG 5 and AgroParisTech



There are four main types of habitats:

a) Grassland
b) Scrubs
c) Woodland
d) Cultivated land



There is a significant presence mosaic cultivated land.

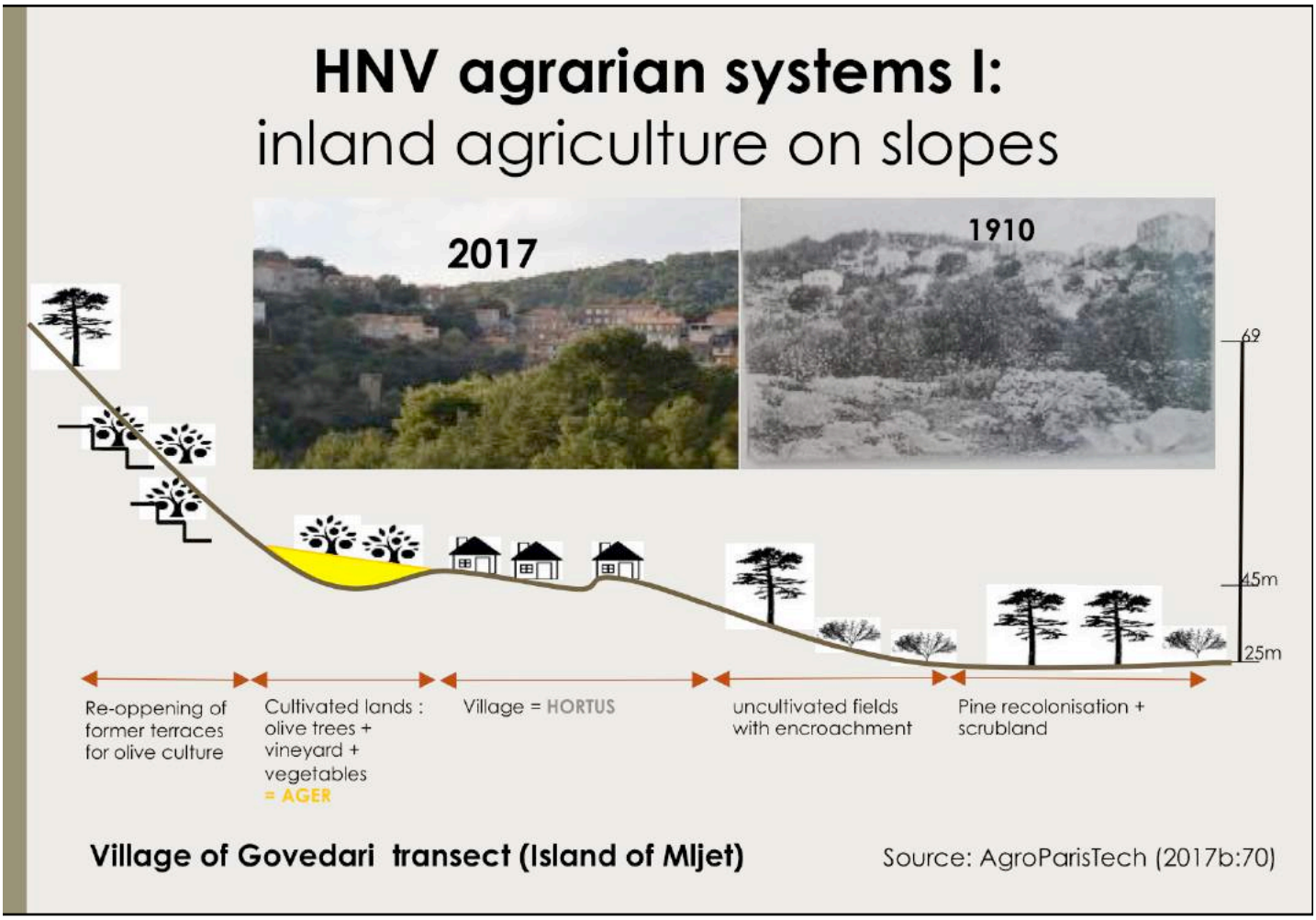
Photo credit: Marija Roglić (LAG 5)

Landscapes and transects

- three zones: coastline, mountain part, central plateau
- traditional settlements are usually situated in the bottom, between field and hill
- spontaneous tourism development led to overurbanisation along the coast

Punat in Korčula.
Source: Antić-Brautović et al, 2008:244

Coastal settlement Supetar (Brač),
Source: LAG5, 2017

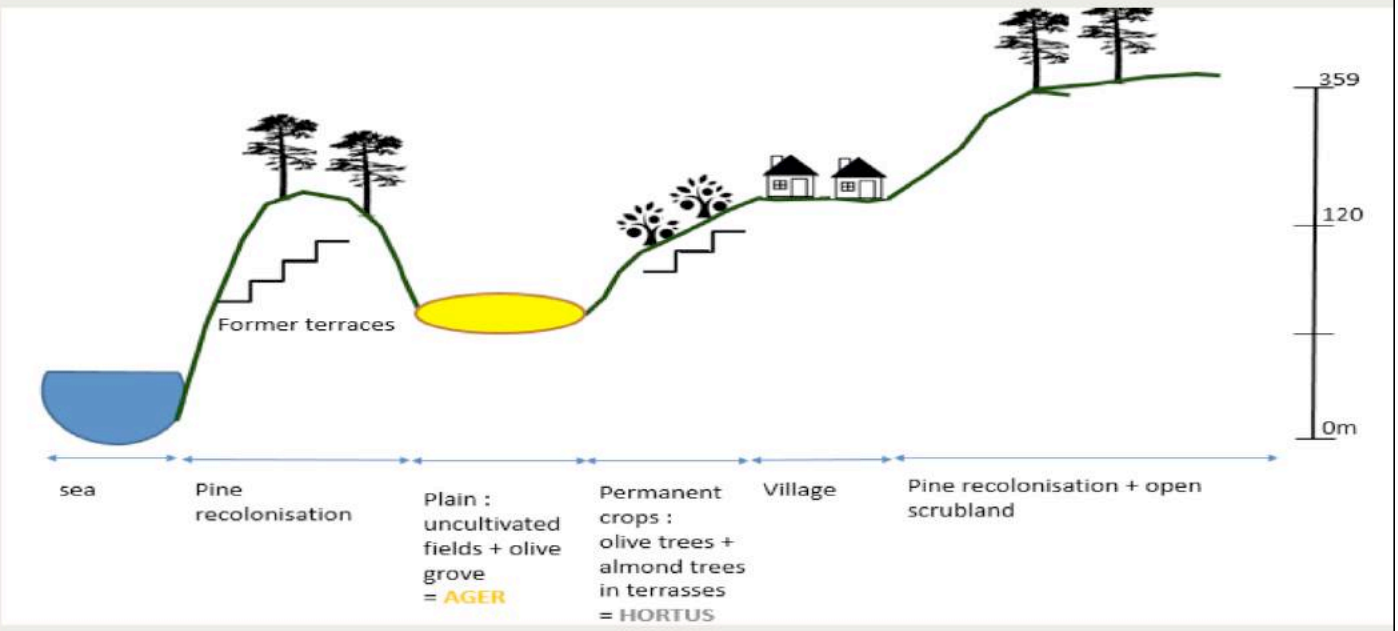


The HNV farming systems in the LA Dalmatian islands are linked to the adaptation of the agricultural practices to the landscape. Based on the geomorphology and agricultural activities in the islands the HNV farming consists mostly of a mosaic of low intensity farming mainly composed of small fields of arable plots, vegetable gardens, olive groves, orchards and vineyards, usually on terraces or surrounded by stone walls (Abdessater et al, 2017:49). Orchards and olive groves with large, old trees and a semi-permanent understorey are characteristic HNV type 2 in the LA.

The coastal villages are organized as ''huerats'' with ager that is characterised with a highly diverse small scale agriculture (Abdessater, 2017:111).

Photo credit:
Govedari (Mljet), postcard used in 1910, collection of Krunoslav Leko, source: Goleš, 2014

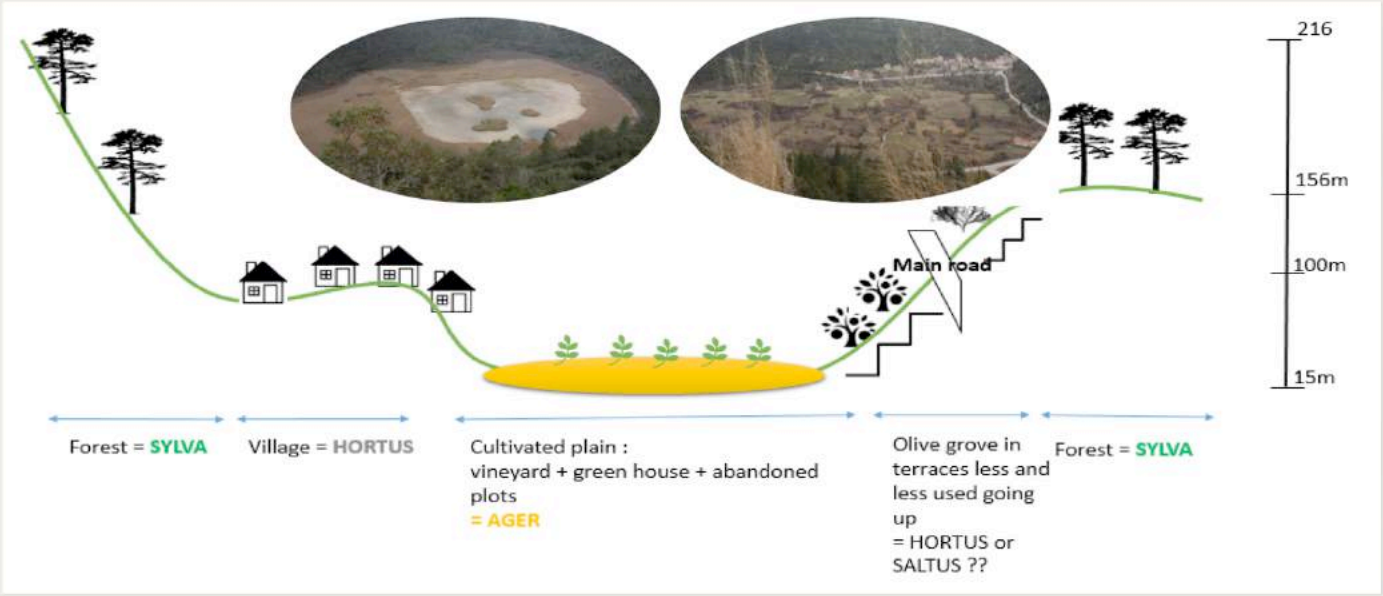
HNV agrariran system II:
costal-inland agriculture on slopes



Village of Maranovići transect (island of Mljet)

Source: AgroParisTech (2017b:68)

HNV agrarian systems III:
inland agriculture in ager

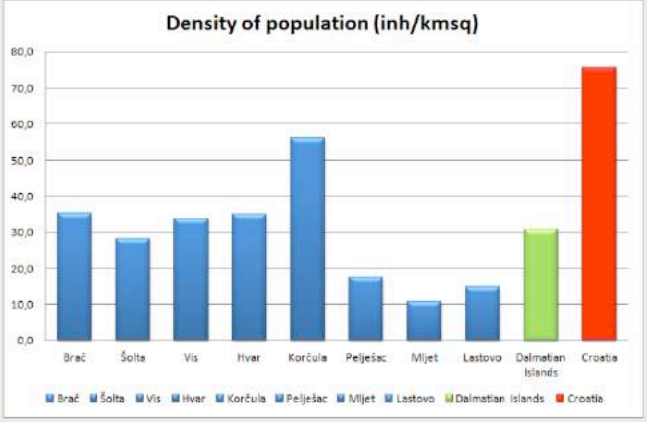


Village of Blato transect (Island Korčula)

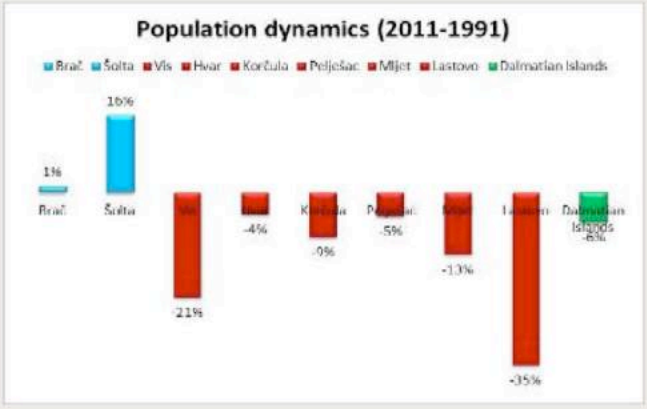
Source: AgroParisTech (2017b:70)

Human geography: Population

Polupation density in LA Dalmatian Islands is almost 2,5 times lower than the national average due to long-lasting depopulation process. Root causes are isolation and limited resources.



LA Dalmatian Islands is mostly rural area where only 35% of population lives in towns. The closest large urban areas are continent coastal cities Split and Dubrovnik.



Population on islands decreased by 6% from 1991 to 2011.

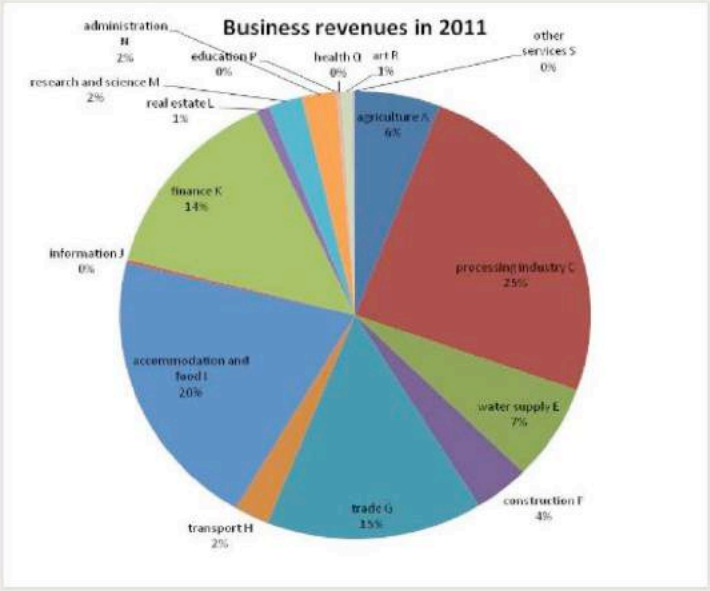
The highest number of people has been identified at the beginning of 20 century (high fertility rates has been overcoming long-lasting depopulation process that has been started in 19 century till 1921). Number of inhabitants decreased from 87.839 in 1921 to 57.566 in 2011 (by 34, 47%).

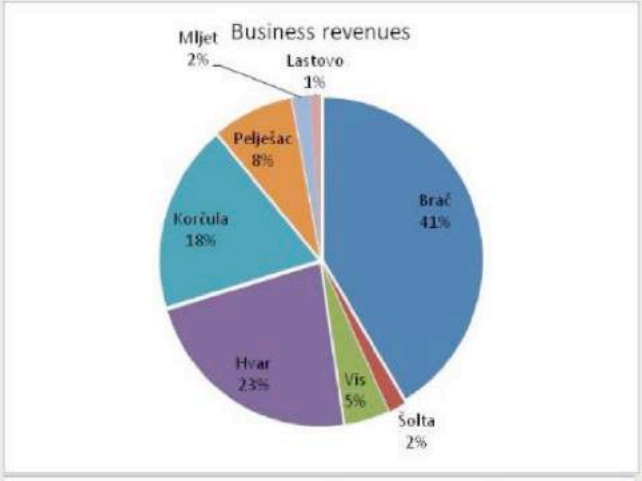
Several municipalities had some legal characteristics of towns (e.g. Korčula). Since municipalities have more people employed in public services with lower risk of losing their job they are demographically more resilience than villages.

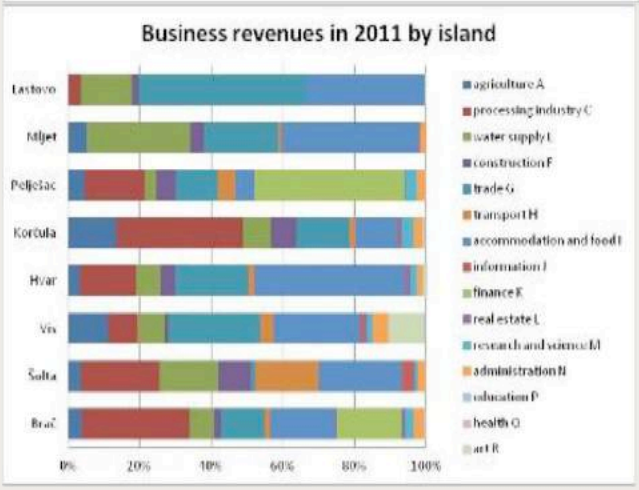
The lowest depopulation has been detected in the towns on the cost with the tourism as a dominant sector.

Human geography: Business revenues

Total business revenue of the LA Dalmatian Islands in 2011 is 294 million euros (source: FINA*).





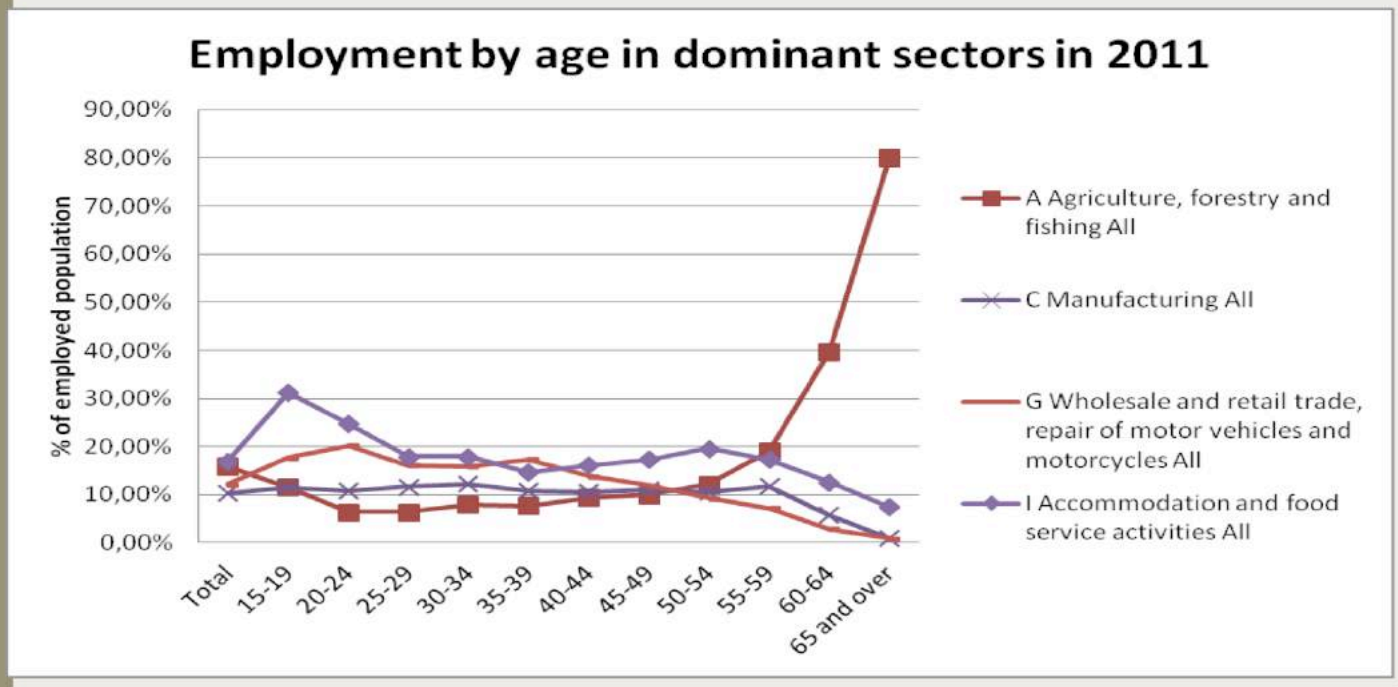


The economy of LA Dalmatian islands has been defined by natural environment and therefore its structure was very simple with large number of areas of economic activity missing or weakly present (islands were highly depended on agriculture production) (Defilippis, 1997).

The largest share of revenues belongs to business entities (which do not include crafts and family farms) is realised in service economy (accommodation, food, trade, transport and finance). Processing industry plays very important role on Korčula and Brač.

*FINA collects data from the business legal entities such as companies. This dataset does not include business data about family farm, public entities, crafts or NGO-s. Later in the presentation it is mentioned that family farms are the main organisational units in agriculture. Thus, business data from FINA does not capture agricultural activities adequately.

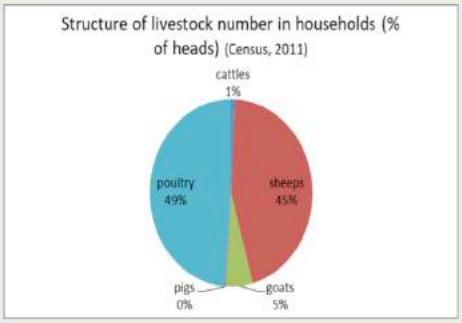
Employment: Age structure imbalances

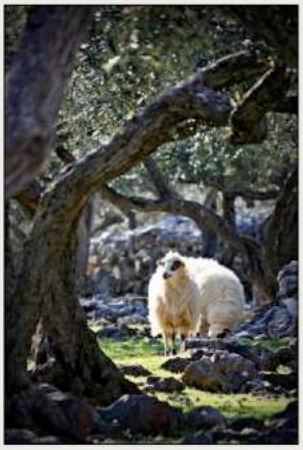


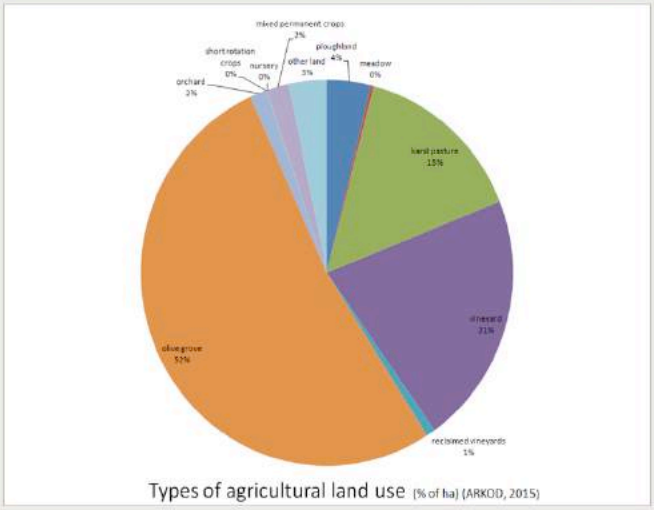
80% of employed population of age above 65 is in agriculture, while the most of young population (15-29) is employed in service sector.
Agriculture is job intensive sector since it creates 6% of the local revenue and employs 15% of labour force.

Agriculture: Key facts

- Agricultural land covers **10.802 ha (5,8%)** of the LA surface
- **Land fragmentation:**
  - Average size of agricultural cultivated land is 1.17 hectares
  - 55% of family farms have less than 1 hectare of agricultural cultivated land
- Land use:
  - karst pastures (15%),
  - vineyards (21%) and
  - olive groves (53%) in 2015 (ARKOD).
- Livestock:
  - small size: total number of domestic animals in households was 32.652 in 2011.
  - based on sheep, poultry and goats
- Man-made **terraces** and **mosaic agriculture**







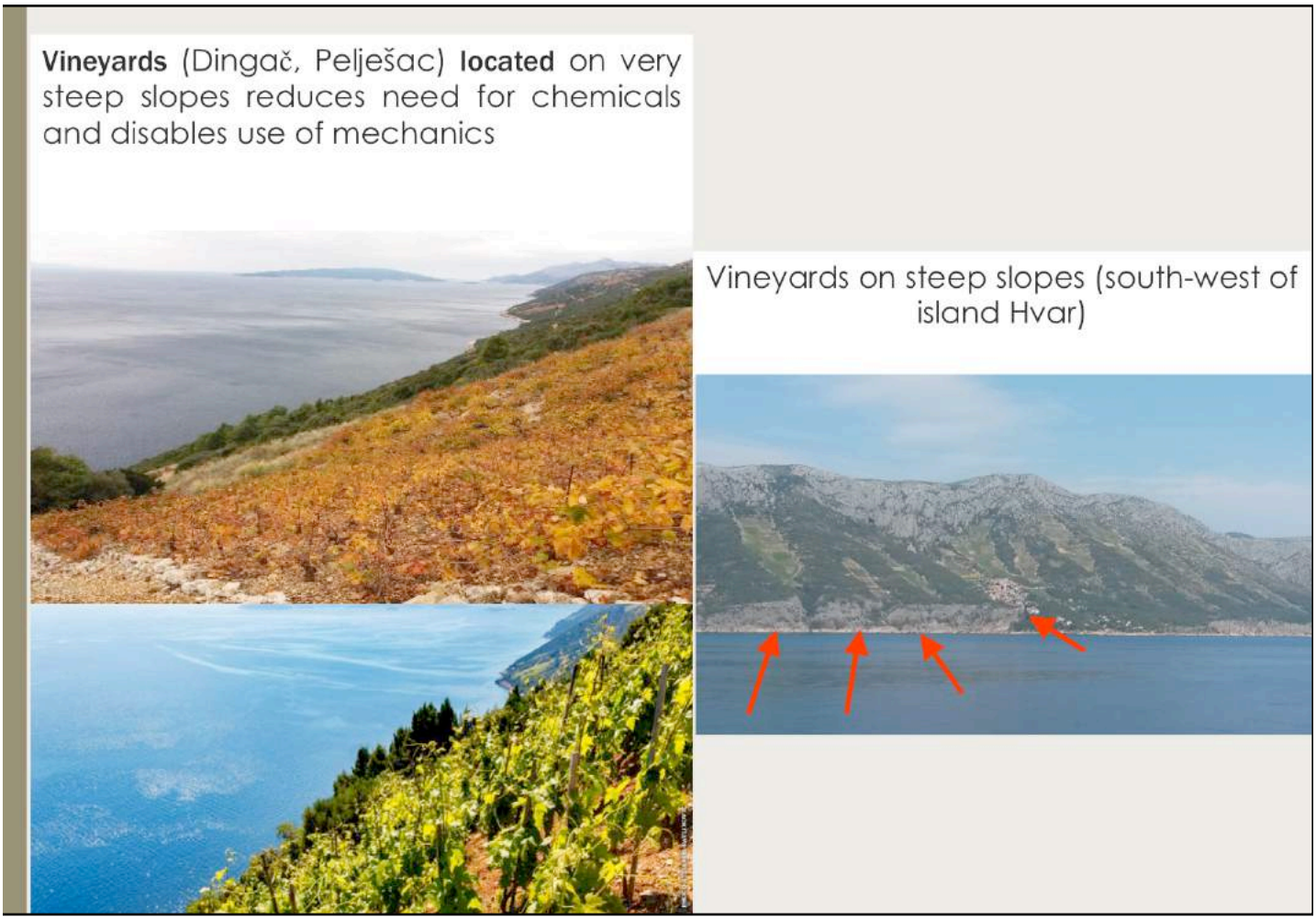
Threats:

Agriculture in Croatian Islands is particularly sensitive to *drought* periods and extreme temperature shocks. Rainfalls transmit pollutants (e.g. sulphur) to the agricultural areas on islands (*which for now does not represent a significant environmental threat*). On the other hand, intensive agriculture on islands pollutes environment, such as vineyards on Vis, Korčula, Hvar and Pelješac) (Kružić and Povh Škugor, 2015:41). Furthermore, *forest fires* which are very often in summer in the Coastal Croatia degrade natural habitats, improve soil erosion, and contribute to extinction of various species.

Use of main production factors explaining HNV features

- **Large wine producers:**
  - own grape or grape from local suppliers;
  - machines or labor work (Dingač, a type of wine is cultivated on very steep slopes and thus, it is labor intensive production);
  - chemicals (copper sulphate, mineral fertilizers, herbicides and pesticides)
- **Small wine producers:**
  - do not use mechanics,
  - family labour force,
  - copper sulphate
  - manure
- **Production practices which promote HNV farming:**
  - vineyards on slopes and terraces – dryer terrain, herbicides and pesticides not needed, use of mechanics is not possible
  - olive cultivation in general is meant to be closer to HNV principles than grape cultivation
  - vegetables are produced mainly for own consumption and are thus usually more environmentally friendly.

(AgroParisTech final presentation, 2017, slide 56)



Dingač is a specific location on island Pelješac at very steep and sunny slopes. It is adequate for cultivation of high quality black grape plavac mali. Wine produced at this specific location is also cold Dingač. Steep slopes and sun enable very fast runoff and created very dry microclimate which prevents development of grape illnesses. Weed growth is also limited due to this specific terrain. Due to very limited accessibility, grapes are cultivated by hand using safety ropes (to prevent falls down the slope). There are other similar sites within the LA.

Photo credit: LAG5 (left); EFST (right)

Endangered species and HNV farming

Iris

•status: least concerned

Iris pseudopalida, Korčula (Jasprica i Kovačić, 2014, str. 21)

Orchidaceae

- Status: vulnerable
- Threat causes: agriculutral land use abandonment and progression of machia and forests
- Friendly habitats: abandoned terases with vineyards and olives (Jasrpica and Kovačić, 2014:85)

Orchis tridentata Scop (Author: Marija Kovačević, 16/5/2015; source: Flora Croatica Database; available at: http://hirc.botanic.hr/fcd/show_picture?idPicture=81589&thumb=1)

Salvia •status: near extinction

Salvia brachyodon Vandas, Author: Jeričević, M., 12/10/2014.; source: Flora Croatica Database; available at: https://hirc.botanic.hr/fcd/Galerija/Slika.aspx?idPicture=64269)

Tansy (*cro. Buhač; lat. Tanacetum cinerariifolium*)

- Status: endemic
- natural pesticide
- contributed to the local economy between two world wars
- habitats: rocky terrain, bušici, olive groves, vineyards (Jasrpica and Kovačić, 2014:85)

Tanacetum cinerariifolium (Trevir.) (Author: Ruščić, M., 12/11/2014; source: Flora Croatica Database; available at: https://hirc.botanic.hr/fcd/Galerija/Slika.aspx?idPicture=65061)

Dalmatian islands are a very important area of biodiversity. Land use abandonment is recognized as the major threat for biodiversity due to succession caused by lack of mowing and pasture (Nikolić et al, 2009:23) The greates biodiversity found

The timeline consists of four periods:

1. Heritage from the past (-1945)
    - ends with WWII
2. Extraction of capital accumulation from agricultural, collectivisation and agrarian reform (1945-1967)
    - end with abolishment of mechanics purchase prohibition in agriculture
3. Associated labor organisations for cooperation and economic crises (1967-1990)
4. Croatian independency (1991-present)

Heritage from the past

Population: The highest number of people has been identified at the beginning of 20 century, (high fertility rates has been overcoming long-lasting depopulation process that has been started in 19 century till 1921)
Cities: Several municipalities had some legal charateristcs of towns (e.g. Korčula)
Transport: weak connection with mainland (islands were focal point in transport and trade networks by the end of 19th century)
Governance: local self-government, top-down decision-making, one municipality per island
Main economic activities: The economy of LA Dalmatian islands had been defined by natural environment and therefore its structure was very simple with large number of areas of economic activity missing or weakly present (islands were highly depended on agriculture production).
Cooperatives: The first agricultural cooperative in Croatian Islands was established in 1864 in Korčula (Mataga, 2005)

- several attempts during 20th century to substitute agricultural dependency by industry: shipbuilding (Korčula), navigation (Orebić), food production (Postira-Sardina), stone extraction (Brač)
- since agriculture on island was not very productive, a need for development of other sectors was present. Fishing and fish processing were lowering dependency on other agricultural activities. Query flourished due to high demand for local marble and other types of stone.
- foundation of tourism
- trade, and thus, shipbuilding, was fostered during the golden period of wine export. Capital accumulated in agriculture was directed toward trade.

Source of photo on the bottom left: http://www.mdc.hr/hr/mdc/zbirke-fondovi/fototeka/muzej-opcine-jelsa-vinogradarski-muzej-pitve/

The wine boom of the late XIXth century – the early XXth century crisis

Vis port in time of grape collecting, postcard used in 1906 (source: Goleš, 2014)

Italian ship Orazio which was transporting inhabitants of Brač to Chile, from 1932 to 1940 (Ostojić Petrov, 2007)

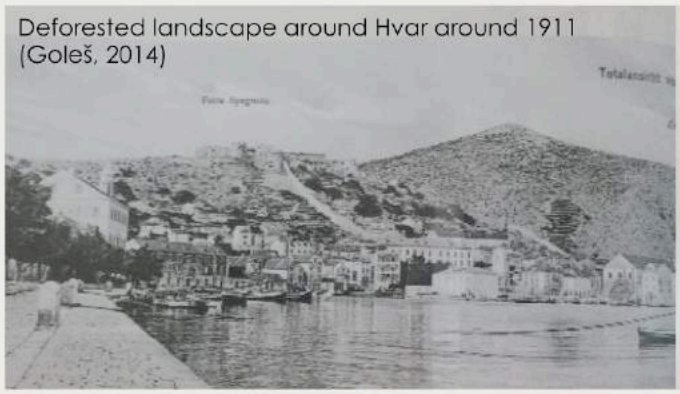
Causes and consequences:

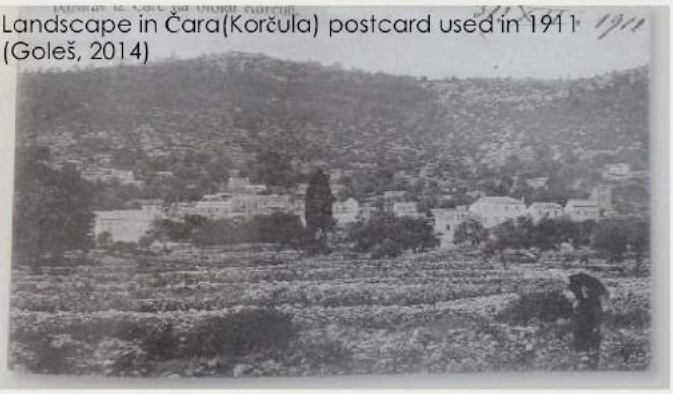
→ phylloxera in France and Italy (after 1850)
→ Increased demand for wine from Dalmatian islands
→ Intensive plantation of new vineyards in Dalmatian islands
→There is sufficient labour force but limited agrarian surfaces.
→ Deforestation, construction of terraces, cutting olive trees
→ Maximum number of vineyards surfaces around 1890
→ Entrepreneurship development, land ownership growth, maritime transport , trade, establishment of cooperatives
→1892 Wine clause: Wine import from Italy to Austro-Hungarian empire is allowed
→ Decline of wine demand (wine prices drop from 25-30 forinters/hl to 6-12 forintes/hl)
phylloxera in Dalmatia (from 1894)
→ Agricultural and economic crises and emigration at the beginning of 20. st.

- Despite very high natural population growth, Brač and Hvar and suffered an absolute fall in population in 1910 due to emigration (Antić, 1995:294).

- After 2nd Word War agriculture dominates in Dalmatian area
  - Share of agricultural in active population in 1953 is 61%, based on Population Census (Defilippis, 1997:143)
- Vineyards dominate in Dalmatian Islands in 1931
  - End of 19th st. and beginning of 20st is characterized by short period of growth and then decline of wine market
  - Due to phylloxera in France and Italy demand for wines from Croatian islands increased
- Farmland fragmentation => no capital accumulation
  - Among the regions in A-H monarchy, Dalmatia was ranked first in percentage of farms of size less than 2ha, and last in percentage of farms larger than 10ha
    - 1902 61,52% of farms had size less than ha (Antić, 1995:292)
  - October 19 1930 – Law on liquidation of agrarian relationship
    - Feudal relationship is abolished
    - Peasants became land owners and landlords get reasonable reimbursement
    - land fragmentation
- Livestock:
  - Dalmatia in general is relatively poor in terms of livestock compared to Croatian regions. Domestic animals are even less present in Dalmatian Islands. Based on data from 1900 and 1935 it can be speculated that up to one hundred cattles, between 5 000 and 10 000 sheeps and goats are expected to be found on a Dalmatian island before WWII.
  - Special breeds of sheep pramenka evolved in islands due to isolation, for example in island Brač. Pramenka gives low returns but it is very resistent and adaptive to extreme conditions such as on islands. Defilippis (1997:224) mentions that breeding of sheep pramenka is mostly oriented on lamb production. Common way of production is in cattles of 20-30 animals which are kept in enclosed pastures and olive groves. They are given additional feeding and their return is 1,5-2 youngsters per year which is considered

Deforestation, wine, terraces and erosion


Deforested landscape around Hvar around 1911 (Goleš, 2014)


Landscape in Čara(Korčula) postcard used in 1911 (Goleš, 2014)


Stone walls and mosaics in Selca (Brač) around 1912 (Goleš, 2014)

- Erosion – a consequences of wine crises and previous deforestation for the landscape:
  - "The naked mountains do not give sufficient pasture for the livestock. The unorganised water and mountain streams disperse the juices of the land" (from newspaper Hrvatska riječ, in Antić, 1995:298).
  - There is a vicious circle: Insufficient pasture forces shepherds to let their animals (goats and sheeps) eat young plants. In this way pastures regenerate even more slowly. The landscape remains bare and erosion progresses.

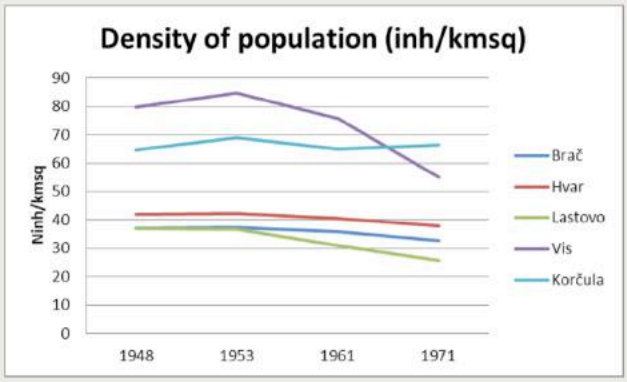
- Large human pressures on pastures and forests till 50-ies (Defilippis, 1997:27-28):
  - heating
  - wood as construction material
  - grazing (goats in particular)
  - heating for lime production

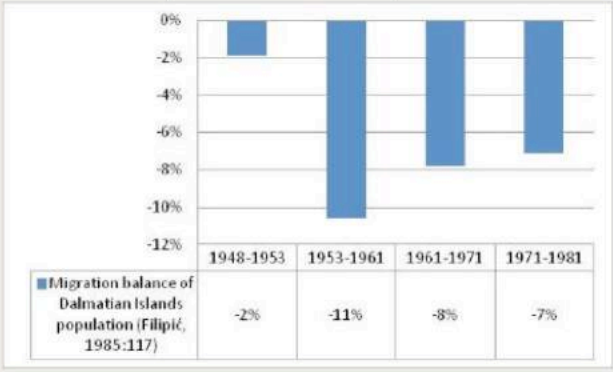
1945-1967

Industrialisation and deagrarisation

Changes in the rural and social context

One of the first high comfort pavilions of hotel Bijela kuća, in Bol (Brač), constructed in 1963 (Source: Vlahović, 2008)





	1948-1953	1953-1961	1961-1971	1971-1981
Migration balance of Dalmatian Islands population (Filipić, 1985:117)	-2%	-11%	-8%	-7%

Institutional context and main issues of development: After 1945 and Before 1990s, LA Dalmatian Islands had been part of socialist Yugoslavia that had a tradition of so-called socialist self-management, with a specific participation at the local authority or municipal level. LA Dalmatians islands were represented with usually one municipality by island. The decision-making in this system were top-down and non-transparent, with informal and impenetrable groups of enterprise managers and senior party officials in control, and with other bodies (e.g. the Workers' councils) existing as a largely powerless bodies (Stubs and Starc, 2007)

Population: The number of people had been decreasing (fertility rates decreasing and long-lasting depopulation process – political and economic motivation)

Cities: have massive differences regarding socio-economic characteristics That is to say?

Transport: By losing the geostrategic and economic importance, transport networking between islands were weak and only development were between the islands and mainland.

Main economic activities: Development of agriculture under cooperative framework and attempts to implement some other activities (e.g. shipbuilding, navigation, food production and tourism).

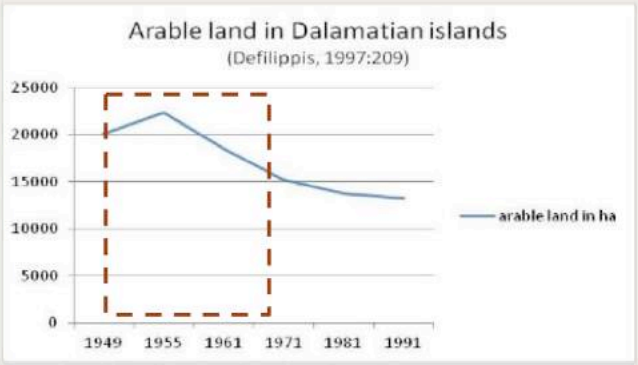
Extraction of capital accumulation from agriculture – cooperatives

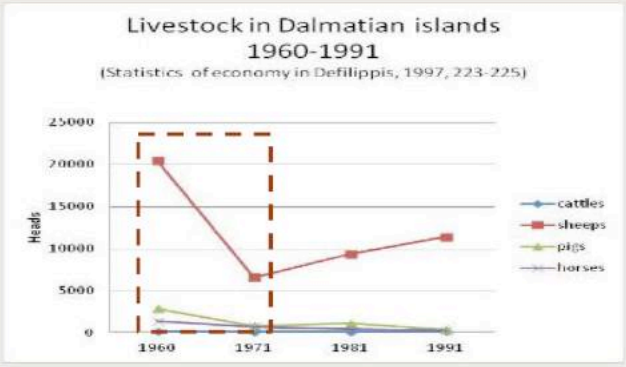
After WWII members of cooperative renovate winery Grgić and wait for first cooperative truck (Pelješac), (Bašić, 2007)

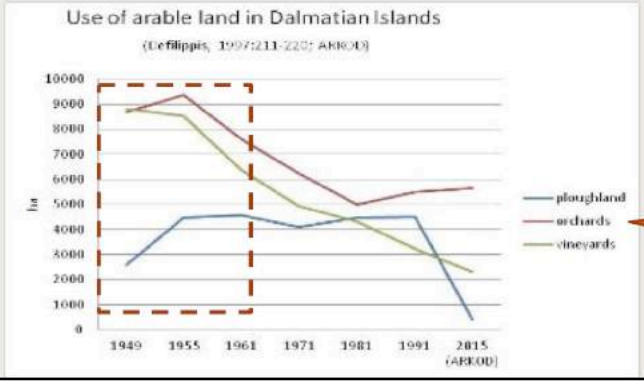
- Agrarian policy measures (Law on agrarian reform and colonization, 23/8/1945):
  - Forced establishment of peasant labour cooperatives (similar to Russian kolhoz), abandoned in 1953
  - Farmland maximum of 25-35ha, in 1953 diminished to 10 ha
  - A ban which prohibited purchase of farming mechanics which was partly relaxed so that purchase of second-hand mechanics was allowed in 1953 and it was completely relaxed in 1967.
  - Permanent consequences for cultivation of grape
    - Public good problem => vineyards become collective property and individual incentive was lacking
    - Vineyards were not cultivated carefully; the consequences were permanent
  - Compulsory redemption of farming products
  - Free work obligation
  - The result is cheap labor and inputs necessary for fast industrialization. Due to tremendous political and economic pressures on farmers, rural population intensively abandons its farmland and moves to urban areas.

- Period between collectivization and agrarian reform (1953-1967)
  - Family farms became involved in social reproduction by cooperation between family farms and cooperatives or social enterprises
  - Cooperatives became important economic and social institutions in rural areas.
  - Small farm unites (less than 2 ha) represent more than half of all farming unites (Defilippis, 1997:155).

Agricultural development







comprises olive groves

Trends in agriculture:

- decrease in arable land size

- livestock:
  - Sheeps dominate in number but it sharply decreases in this period. Numbers of horses, pigs and sheeps fall as well.
  - 1954 Law on prohibition of goat keeping
    - Since goat keeping in public pastures was considered as an important obstacle to forest regeneration, goat keeping was restricted in several attempts dating back from the end of 19th century. The most rigorous was the law from 1954 when goat keeping was prohibited and goats had not been registered any more in official statistics. The law was abolished in 1982.

★ REMARK: Available agricultural data that refer to Dalmatian islands for period 1945-1990 include municipalities from that period of Brač, Hvar, Vis Korčula and Lastovo (Defilipis, 1969:2), and do not include islands Šolta, Pelješac and Dubrovačko primorje. For this reason, presented data serve for obtaining general insights, but not for exact comparison with other periods.

Ends of traditional society in landscape

Japjenica
(Source: LAG Brač)

Goat keeping, landscape and transport till 1970-ies
(Source: LAG Brač)

- Depopulation and deagrarianization trends decrease pressures on land. However, this processes are at the beginning in this period and traditional way of living still requires use of wood for construction and heating while that wood can hardly be regenerated due to animal grazing (especially goats which are prohibited but still present).

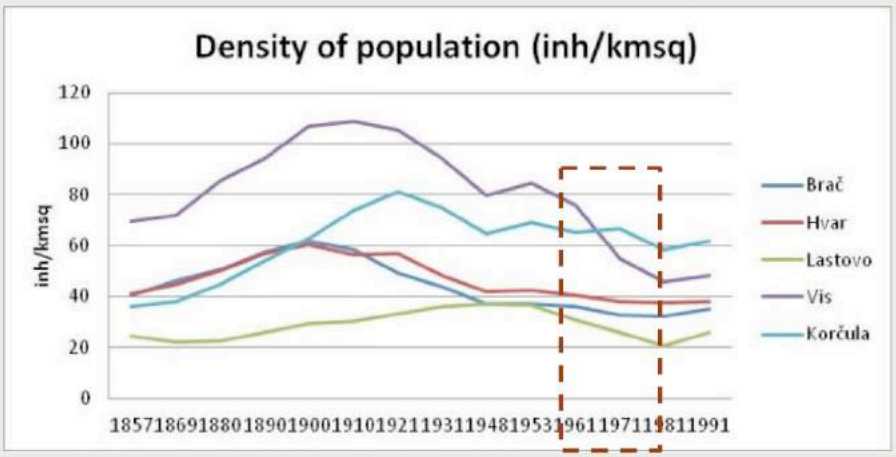
- Japjenica
  - a traditional technique lime preparation for building. Lime had to "baked" for several days. Thus, this process required cutting off a lot of wood/bush on nearby surfaces (Source: LAG Brač).

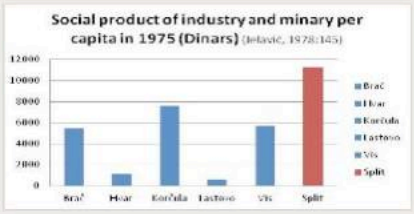
A large economic reform was introduced in 1964/65 which introduced some market mechanisms into socialist economy transforming it into so called "self-governed economy". Export was liberalised. Such changes boosted industrial development and cities growth, as well as labour flow from rural to urban areas.
In 1967 a ban on purchase of machinery was abolished. From this year family farms can freely buy tractors and other machinery equipment. A model of small family farm supported by additional income (employment in industry) become a dominant and successful.

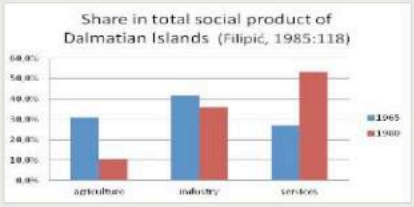
In 1976, one quarter of family farms which increased their size mention an acquisition of the machinery equipment as the main reason, while 70% of family farms which diminished in size mention a decrease in a household labour force as the main reason.

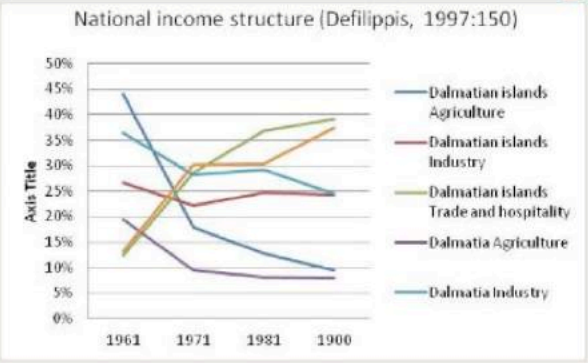
The period ends with establishment of a new state Republic of Croatia (RH) and shift from socialism to capitalism.

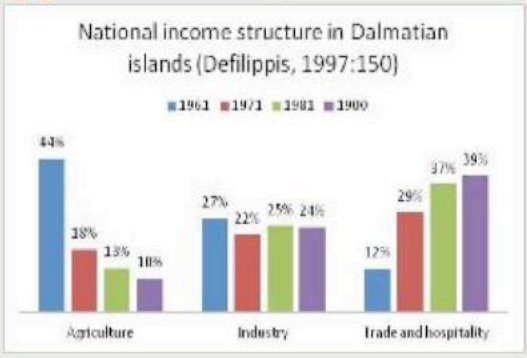
Depopulation continuation and tourism development









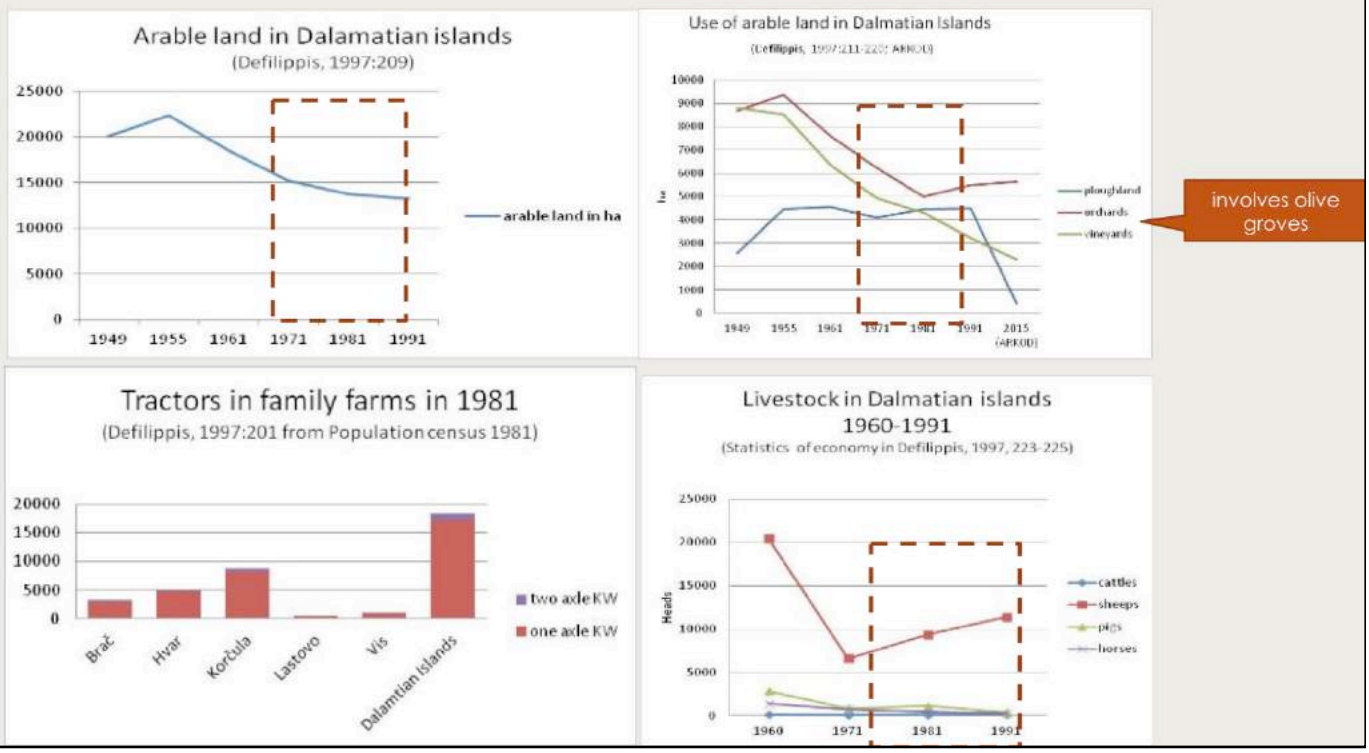


- rural depopulation and migration of young population to cities
- ➢ main reasons: feeling of isolation and detachment from the social dynamics in the other parts of the region as a consequence of weak transport connections (Filipić, 1985:117)
- ➢ young and male populations emigrates => feminisation and aging of the island population
- deagrarisation countinues
- development of tourism on islands (annual growth rate of service sector on islands was 12,2% in period 1965-1980 (Filipić, 1985:118)).

This period is characterised by agricultural decline and tourism growth. Industry grows at much smaller rates than tourism.

REMARK: According to estimations from National island development program (1997:9) estimated number of inhabitants (based on actually present population and natural population dynamics) in islands of Dalmatia in 1991 was smaller than numbers recorded in official statistics for years 1981 and 1991.

Agricultural development



Sub-periods of agricultural development:

➢ Associated labor organizations for cooperation (1967-1980)

Cooperatives transform into self-governed enterprises which are income oriented.

Due to abolishment of the ban on purchase of mechanics, massive mechanization of small family farms take place in this period. Thus, small family farms become more productive.

➢ Economic and social crisis (1980-1990)

- Introduction of new olive oil processing plants (1980-1990):
- movement of olive grove revival
- plantation of new olive trees

Trends in agriculture:

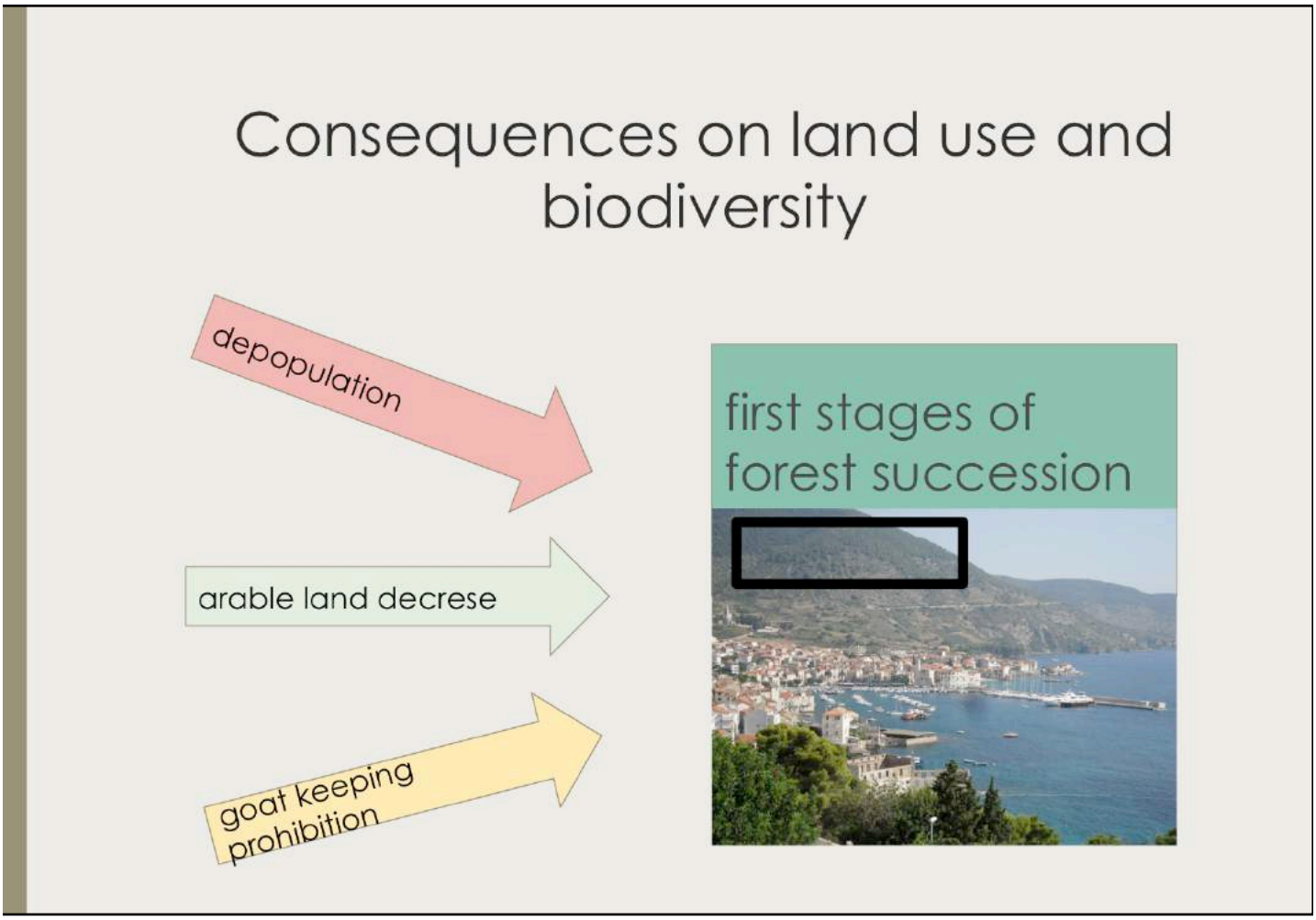
➢ decrease in arable land size

- olive groves revival
- vineyard abandonment

➢ livestock:

- significant increase in number of sheeps (probably due to goat substitution)
- slight increase and then fall in number of pigs
- sight increase in number of cattles
- dicrease in number of horses

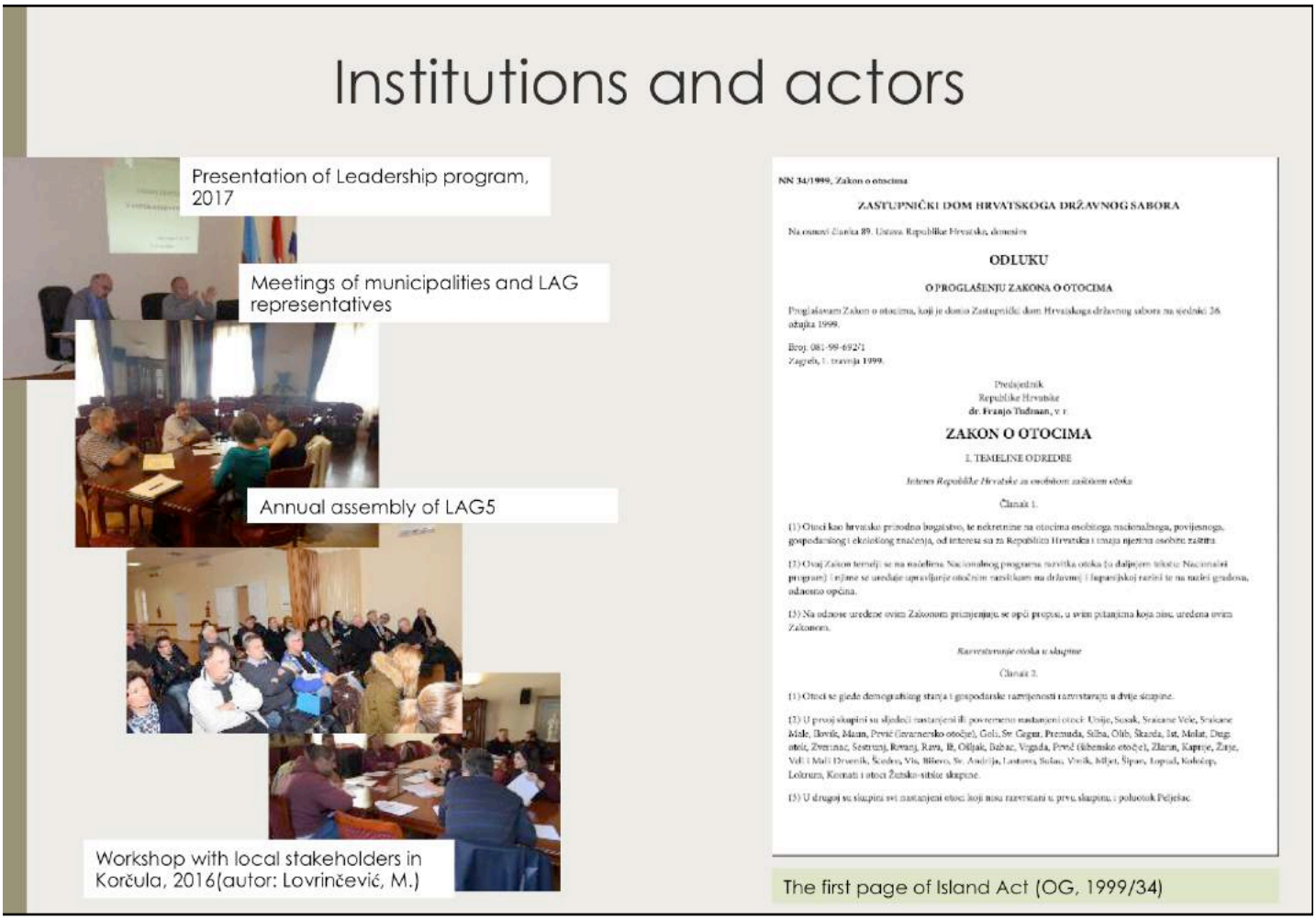
➢ small machinery dominates in family farms (above 90% in number and in kW)



- Forest succession, instead of oak regeneration, dominantly refers to development of Pine forests which are usually linked to low level of biodiversity.
- Development of garigue and “makija”
- Introduction of chemicals in agriculture

Photo credit:
LAG Škoji (Komiža, island of Vis)

Period of Croatian independence and transition to capitalism.



Governance: many small local-government units which do not have sufficient fiscal capacity for good governance and effective management.

The Island act: The situation in LA Dalmatian islands has been determined also by unique institutional characteristics of the islands. The institutional differentia specifica of the islands has been tried to implement in national programmes and regulatory frameworks such as: National Island Development Programme (1997) and the Island Act (1999, 2002, 2006). This programmes have been partially implemented (Stubs and Starc,2007)

Relevant institutions:

- 2 the most relevant ministries:
  - Ministry of regional development and EU funds
- Department for Islands
- Island Council (consultative body to the Ministry)
- Ministry of agriculture
- Paying Agency for Agriculture, Fisheries and Rural Development
- Advisory Office for Agriculture (Poljoprivredna savjetodavna služba)
- Local agriculture cooperatives
  - since 1864 and first agricultural cooperative on Croatian islands established on Korčula
  - important local rural stakeholder during Yugoslavia (before 1991)
  - neglected after Croatian independence
  - recently reestablished in a modified form
- LAGs (Leader Program)
  - focal point of comprehensive development with participation of local community
  - Škoji (Šolta, Hvar and Vis), LAG5 (Pelješac, islands Mljet, Korčula, Lastovo and municipality Dubravačko primorje) and LAG Brač (Brač)

Changes in the rural and social context

The main trends during the whole timeline:

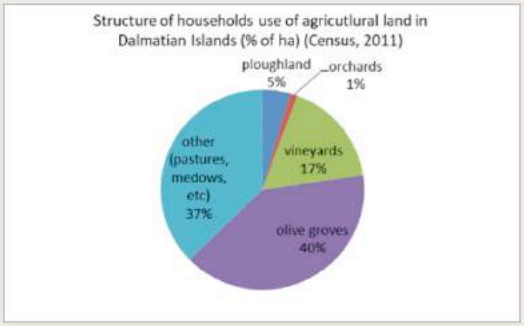
- Depopulation
- Ageing

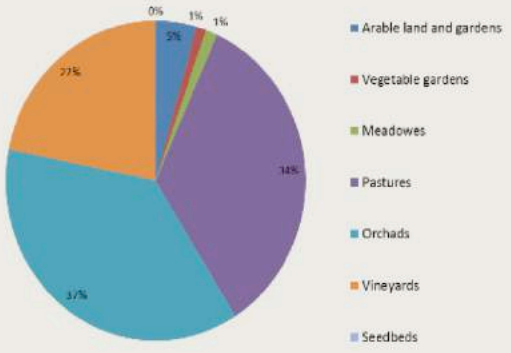
Size of a class in Korčula in 1977 and 36 year later in 2013

Despite significant infrastructural investments (public utilities, transportation network, electricity, telecommunications) depopulation trends continue. Its manifestation is size of school classes.

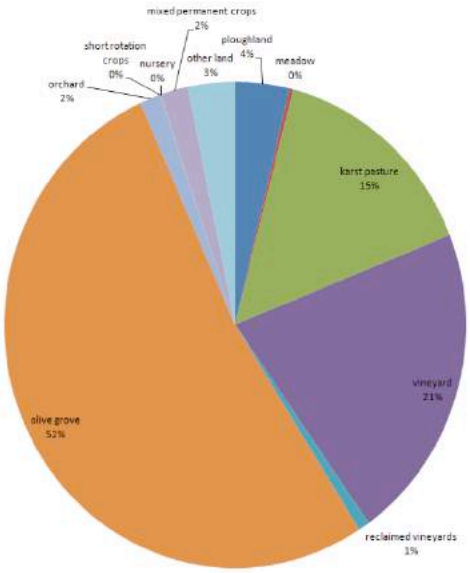
Agricultural development:
Olive groves revival

agricultural land covers 10.802 ha or only 5,8% of the LA surface (ARKOD, 2015)





The LA's structure of total utilized agricultural land by categories, (CBS, 2003)



Types of agricultural land use (% of ha) (ARKOD, 2015)

- Relatively recent sources of data about agriculture in LA Dalmatian Islands:
  - 2015 - Paying Agency for Agriculture, Fisheries and Rural Development (PAAFRD) and National register for agricultural land use (ARKOD)
  - 2011 – Population Census
  - 2003 – Agricultural census (Croatian Bureau of Statistics [CBS])

- Agricultural land covers 10.802 ha (5,8%) of the LA surface with following dominant types: karst pastures (15%), vineyards (21%) and olive groves (53%) in 2015 (ARKOD).

- Although different motivation and data collection methodology applies, graph on the left based on Agricultural census (CBS, 2003) reveals similar structure: vineyards occupy 21% of utilised agricultural land, orchards and pastures is consistent with sum of olive groves and karst pastures from ARKOD (2015). The olive groves are contained under orchards in CBS (2003) and one can speculate that from 2003 to 2015 registered olive groves surface increased, while pasture surface decreased. Motives might be linked to subsides as well as to actually transition processes. Revival of olive grove cultivations is taking place. The same structure is revealed in data from Population Census (2011).

- State subsidies were asked for 70% of cultivated land in 2015, mostly as a compensation for natural and other constraints, as well as for preservation of autochthon and protected species. 5,64% of surfaces with demanded subsidies refers to transition to ecological practices. There are no demands for HNV farming practices such as for maintenance of field strips or HNV pastures, except for maintenance of extensive olive groves. (Croatian system of subsidies for agriculture includes several subsidy types for HNV farming practices just mentioned).

Vineyards on slope on Pelješac peninsula

Vineyards in the field, Trnovica, Dubrovačko Primorje

Traditional, extensive way of collecting olives (photo from 60-ies above, source LAG Brač) still dominates in LA Dalmatian islands (photo from 2016, source: Katarina Jakšić). However, olives can be collected by supportive mechanics (photo on t. source LAG 5)

- Two types of vineyards (photos on the left):
  - on slopes - more labour intensive but require less chemicals
  - in the flat fields

- Olive collecting process through time (photos on the right)
  - traditional labour-intensive process of olive collection dominates since terrain is usually inaccessible

- Bee-keeping is important link in agriculture

Photo credit:
LAG 5
Katarina Jakšić

Wine production:
Introduction of modern equipment

Stone grinding machine, Plančić, Hvar (sorce: Krstulović, 2008)

Revival of vineyards in Pelješac

Grgić winery on Pelješac suffered tremendous loss in 2015 due to the forest fire in surrounding (source: LAG5)

Interview with a manager of winery Grgić and barrels for wine keeping, 2017 (source: EFST)

Livestock

Sheeps on Brač (2016, source: Slađana Pavlinović)

- Livestock is based on sheeps, poultry and goats
- Total number of domestic animals in households was 15.881 in 2011

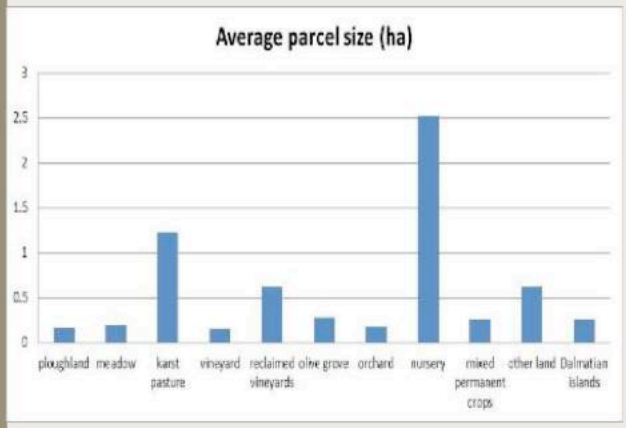
Livestock	Number of head
cattle	252
sheeps	14.685
goats	1.754
pigs	80
poultry	15.881

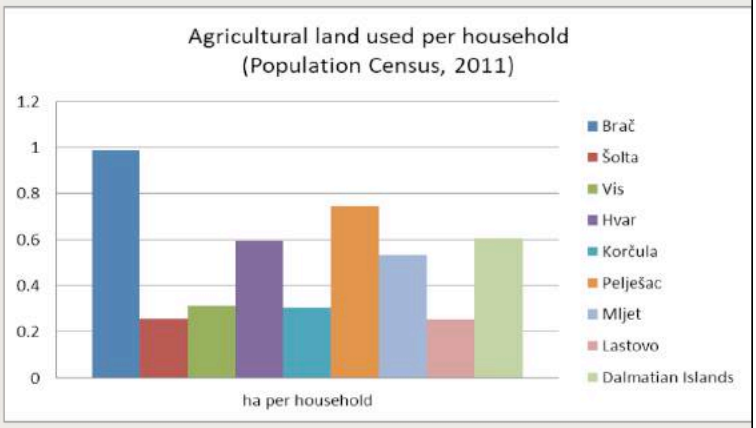
In LA region there was a total number of livestock of 32.652 heads in 2011 (Census) out of which around 15.881 was poultry and 14.685 sheep. However, collected data do not allow detailed spatial livestock analysis.

Fragmentation

- Highly fragmented lands with 40 552 parcels
- Average parcel size: 0,27 ha
- data source is ARKOD (2015), a national register of agricultural land use

- 21.701 households registered at Census (2011) used 13.138 ha of agricultural land
- Average surface of used agricultural land per household is 0,6 ha per household.

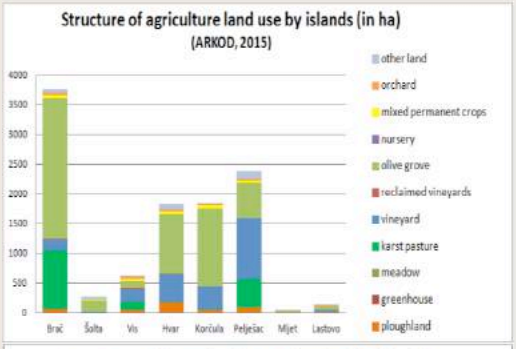


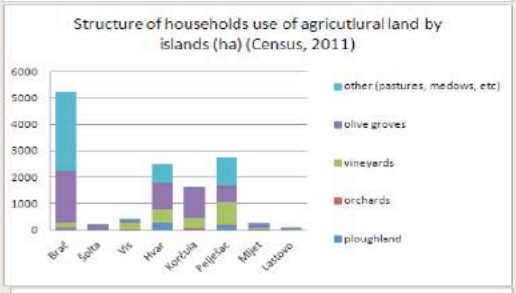


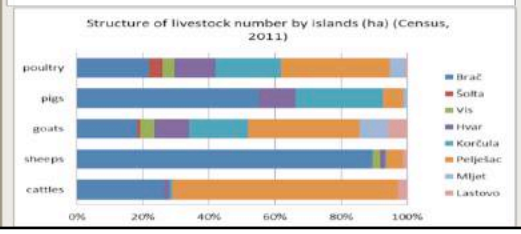
- Highly fragmented land and mosaic:
  - average parcel size of 0,27 ha (ARKOD, 2015)
  - average surface of used agricultural land per household is 0,6 ha per household (Population Census, CBS, 2011).

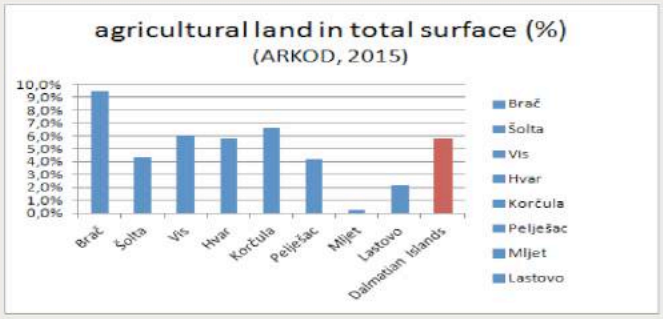
- Implication: limited machinery usage and high demand for labour force in agriculture

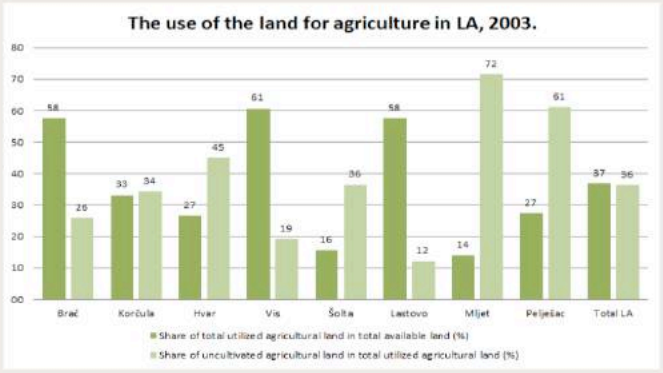
Agriculture: heterogeneity among islands











- According to the latest Agricultural Census (2003) the total available land on LA Dalmatian Islands covers 26.286 hectares. Total available land comprises of total utilised agricultural land and other other land. The other land includes unutilized agricultural land and wooded area. The total utilized agricultural land includes arable land and gardens, kitchen gardens, meadows, pastures, orchards (total), vineyards (total) and nurseries. In 2003 the share of total utilized agricultural land in total available land for LA Dalmatian Islands was 37%, while 36% of utilized agricultural land was not cultivated. Brač, Vis and Lastovo are above the average with respect to share of utilized agricultural land in the total available land in LA Dalmatian Islands. Furthermore, they show the highest level of cultivation of utilized agricultural land as well.

- The more recent data do not provide the info on total available land in hectares although they show that agriculture covers 5,8% of total surface of the LA Dalmatian Islands (ARKOD, 2015). This corresponds to the percentage of arable land on islands (National island development plan, 1997:20). Brač continues to be the leading island in terms of agricultural land use, while Mljet (with majority of its surface under national park) has the lowest share of agricultural land use in both analysed years 2003 and 2015.

- Due to karstic area specificities, although limited, agriculture represents very important aspect of life on islands. Together with non-agricultural activities agriculture on islands can assure decent life standard (National island development plan, 1997:22).

Data from Census (2011) indicate certain level of specialization among islands:

- Pastures - Brač which is famous for its lamb production
- Olive groves: Brač, Hvar and Korčula
- Vineyards: Pelješac and Vis
- Brač: pigs and sheeps

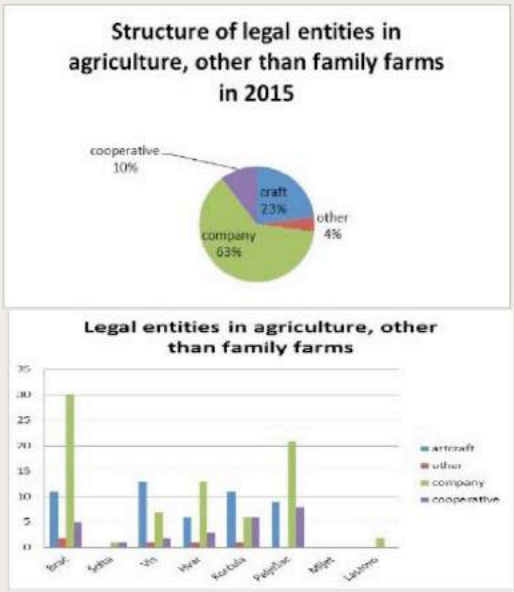
Farms

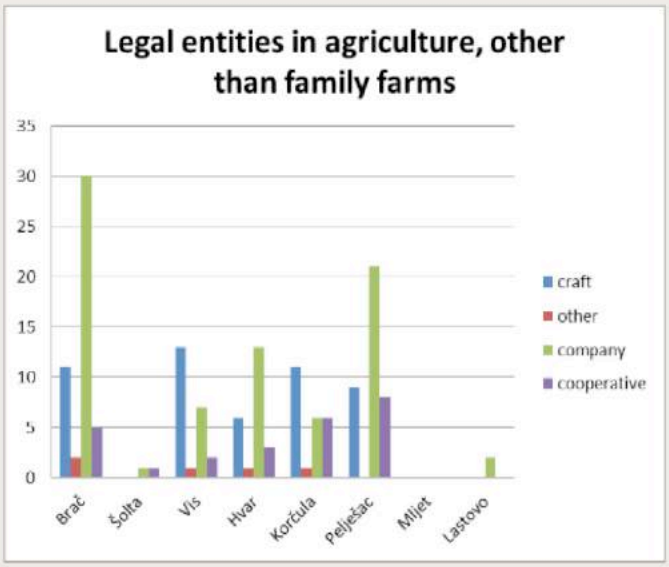
Legal entities in agriculture

- family farms is the most common organisational type of agriculture in Dalmatian Islands

Family farms

- Most family farms employ 1-2 persons
- Korčula dominates in family farm number and (additional) members.



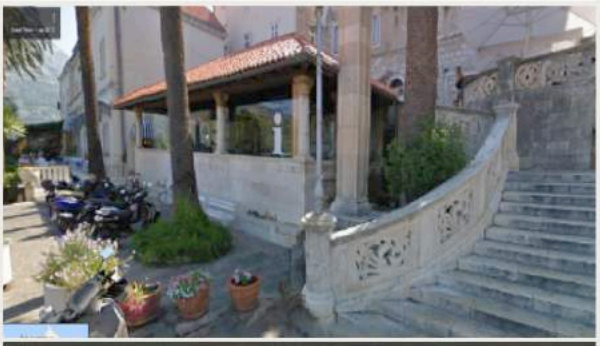


- There were 5.831 family farms in LA Dalmatian Islands in 2015
  - three quarters are governed by males and one quarter by females
  - 4818 members (beside holders of the farms, i.e. every farm has a holder, and some farms have additional members).
  - Thus, 10.649 persons are active in family farms.

- Consequences of family farm dominance in numbers:
  - small-scale production
  - low capital-intensity agriculture
  - can be full-time, but also a part time agriculture (no further relevant data)

Tourism and apartmanisation

- Since 1991, in particular since 2008, growing importance of tourism and related activities



Fish market place in 1950-ies is a tourist infopoint in 2000-ies

Mosaic agriculture as a setting for rural tourism (Brač)

Due to weak government enforcement tourism development is accompanied by significant construction activities (AgroParisTech, 2017:111)

On the left:
Space for fish marketplace is substituted by tourist info point

On the right:
Two types of tourism:
- agrotourism
  - recognised as an opportunity for hinterland areas of island
  - it can fit to the natural landscape
- tourism based on sea and sun
  - intensive construction along the coast

Consequences on land use and biodiversity

- Abandoned agricultural land under forest succession is prone to forest fires (left).
- Once bare stony hills are green today (right).

Reforestation near Chapel st. Ante above Velo Grablje – Brusje (Brač)

In 1961 this area was lavender plantation (right).

Today this area is abandoned agricultural land covered by underbush, process of extensification (down).

BAU combines over touristic development by the shore with land abandonment in the inland, compatible with scarce individual farms able to manage. Landscapes are closing but no one really matters

The main threats for the LA in the current situation is development of tourism infrastructure that will intensify the urbanization process and change the scarce agricultural land in the islands to building land. Increase in large scale infrastructure will put additional pressure to the environment in terms of communal infrastructure management and foster decline in biodiversity due to the reducing of the natural and semi-natural habitats.

If the current situation continues the major threats in the LA that are identified will further increase and cause permanent damage in terms of both tourist attractiveness of the area and biodiversity richness.

Photo Credit:
- Marija Roglić (Orebić, Pelješac peninsula)
- Pero Poljanić (Trstenik, Pelješac peninsula)

Characteristics of rural development in BAU scenario are the following processes:

- Population decreases, but at a lower rate, partly due to negative natural population growth rate, and partly due to emigration of youngs population from islands. Process of population aging continues. Emigrated population returns to islands in older age.
- Since tourism development take place and services require a lot of labour force which is missing due to negative demographic trends, seasonal labour force is imported to island during summer period.
- new hotels are built and tourist resorts are developed. There is increased demand for attractive land with the sea view. Price of real estates increase which increases political pressures to convert agricultural land to construction land. Price of real estates additionally limits young population from choosing islands for settling down.
- Finally, inhabitants leave the island also due to physical isolation. Ferry connections are scarce out of the season. With bad weather ferries remain in their port which additionally pronounces sense of isolation. New catamaran lines to islands are introduced only for tourism purpose during summer.

Actors: local and residential population and NGO-s.

Photo credit: Slađana Pavlinović, Supetar, island Brač

- Tourist demand for vocations on Dalmatian Islands is very high, but with a very short season, limited by weather conditions. There are drastic differences in number of tourists along the year. Very crowded coasts of islands in summer are abandoned out of this season.
- Due to high demand for accommodation, accompanied by weak spatial planning and legal enforcement, process of so called „apartmanisation" takes place along the coast. This leads to development of mass tourism in coastal zones while island inland is abandoned.
- tourism substitutes agriculture in terms of revenue sources. Locals orient to tourism as a source of revenues. Production of wine and olive oil grows and it is mostly exported or sold in expensive touristic shops at very high prices. During the season there is very high surplus demand for food which needs to be imported to islands by trucks loaded on ferries. National food market chains open their shops on islands.
- Local food marketplace and family farm production is marginalised due to dominance of large food retailers and food import to island. Hotels mostly offer imported food since adequate quantities at low prices are not available on islands.
- Actors: investors, property owners and managers, tourists, local population, family farms

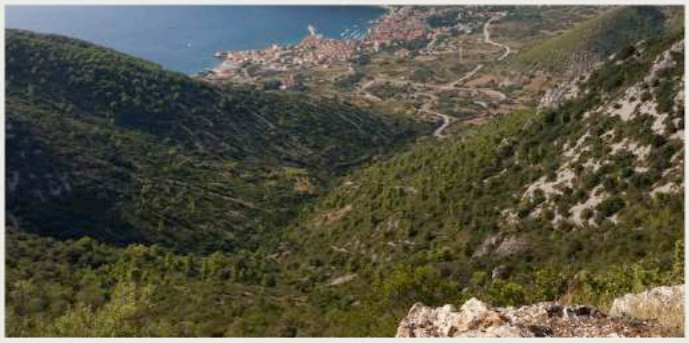
- Development strategies recognised tourism and competitive advantage of islands, so that even public resources are directed for such use (development of touristic resorts, infrastructural investments, etd.). On the other hands, even at political stance, importance of agriculture on islands is not sufficiently recognised so that uniform agricultural measures are not sufficiently adapted for island conditions (small parcels, mosaic agricultures, emphasis on preservation of stone walls and other agricultural heritages).
- There are various EU funding schemes which can be used for island development. LEADER program, and LAG-s on islands represent very important key for local development of islands.
- National and supranational institutions develop various types of certification programs which are suitable for promotion of local agricultural products. Thanks to Island act and efforts at national level, a particular certificate, Hrvatski otočni proizvod, is developed for products composed mainly of local ingredients.

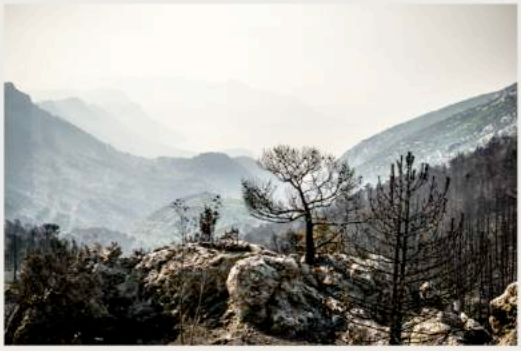
Actors: local, regional and national government, UNDP, EU bodies, LAG-s and cooperatives, Paying Agency for Agriculture, Fisheries and Rural Developmet, and Advisory Office for Agriculture (Poljoprivredna savjetodavna služba)

Resulting consequences on farming economy

- Due to market forces, agricultural island production which is competitive is transformed to large-scale, such as grape and medical plants.
- Otherwise, if not attractive for market production at large scale, agricultural land is abandoned. Moreover, due to depopulation there is no labour force to cultivate small inaccessible parcels.
- However, due to new consumer trends and policy efforts, islands are recognised as very important hotspots for eco-agriculture land is mostly preserved from pollution.

Resulting consequences on land-use and biodiversity





- transforming land use purpose from agriculture to touristic
- grassland decreases
- forest succession and forest fires continue due to missing of livestock to “clean” the terrain
- decrease of biodiversity

Photo credit: Pero Poljanić (Pelješac peninsula - Župsko field- mosaic agriculture)

Discover tradition

BRAČKI VITALAC

- a lamb or goat meat meal – a protected nonmaterial cultural heritage from island Brač.

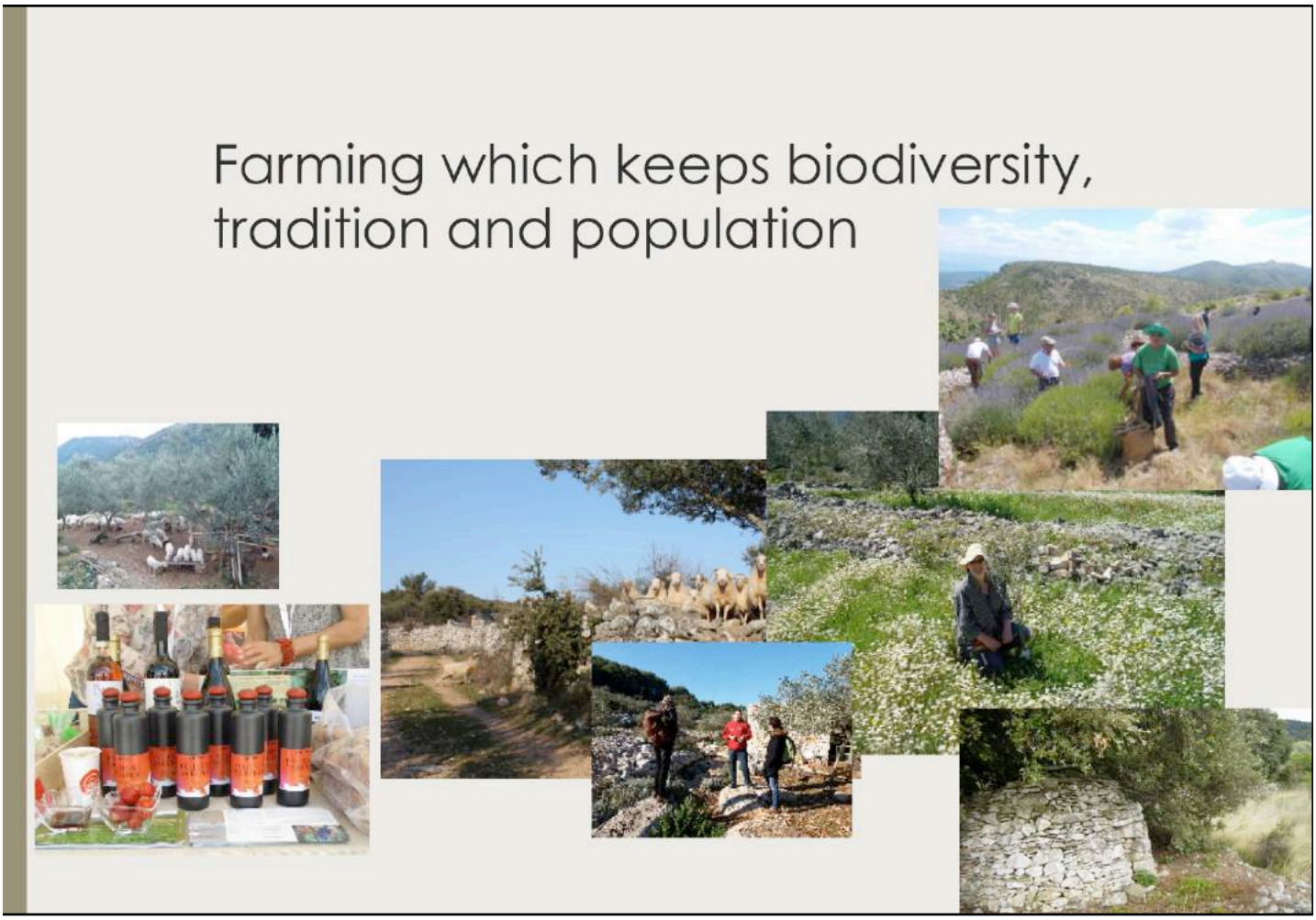
Source: Jakšić, 2014:129

Traditional wheat mill

- usual equipment in traditonal rural houses
- Blaca, Brač (2014, source: LAG Brač)

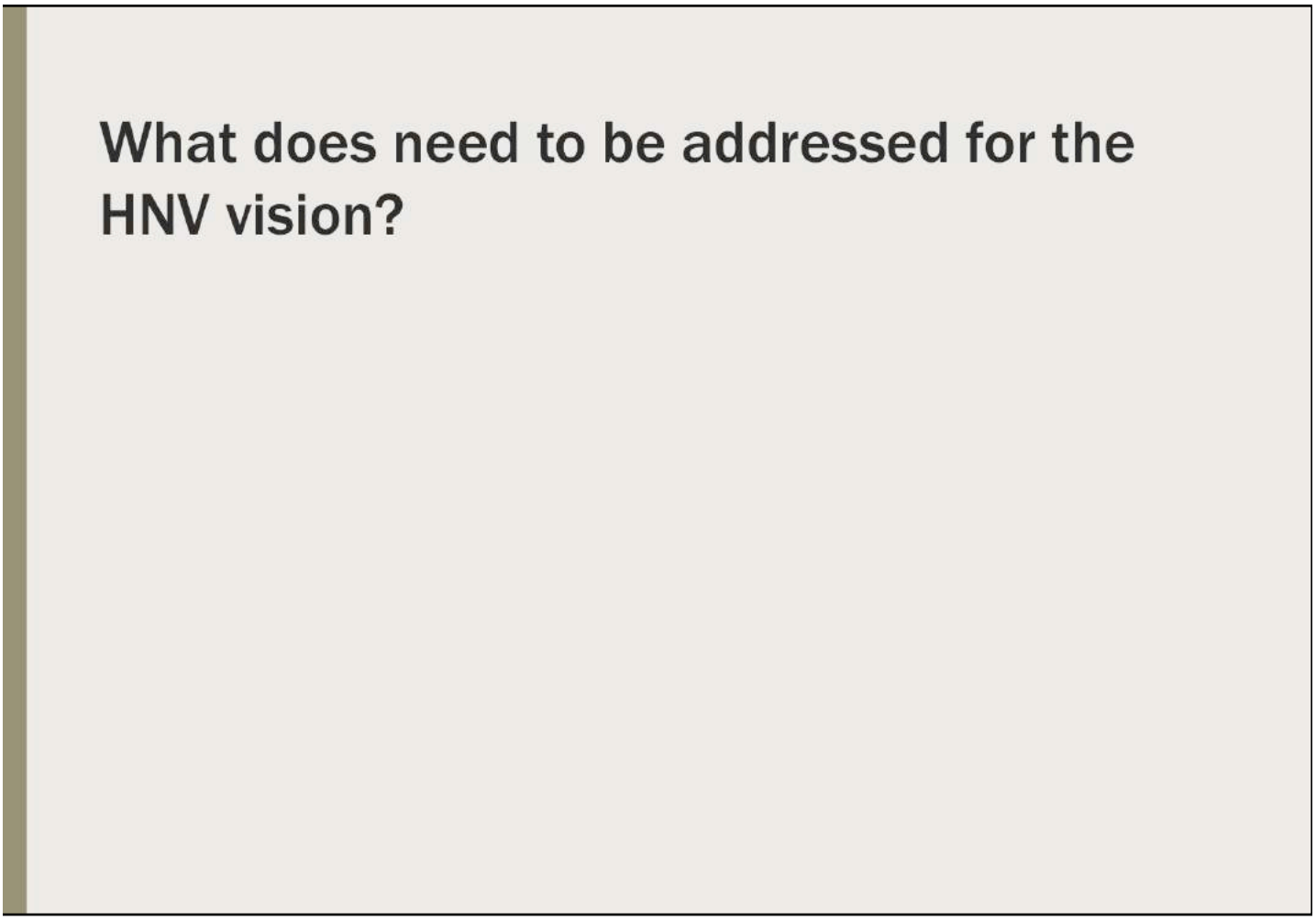
Autohton local product

Inside of sweet shop Cukarin in Korčula (Source: LAG5, 2017)



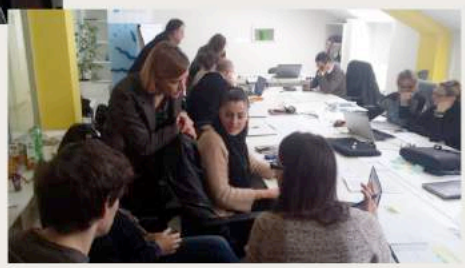
- HNV : local production inland sustain mosaic landcapes at a relatively wide scale, combining different productions with a share from grazing livestock. These systems are low input and are able to market their products. This goes along rebalancing tourism towards the inland.

Biodiversity rich landscape in 2030



Industries which are welcome on islands are those which can be embedded into natural and other values of islands, such as: food processing, stone processing and shipbuilding. Island development cannot be only the responsibility of local leaders but specific set of selective measures has to be developed at the national level (Filipić, 1985:119).

Who are the actors to get involved in the process? How?



BAU scenario

- Mass tourism
- seasonality
- „Apartmanisation"
- Stonewalls disappear
- Tradition lost
- Domestic animals rarely seen
- Seasonal workers in tourism, the places are empty in the winter
- Import-oriented islands
- Supermarkets

HNV scenario

- Agrotourism
- Tourism along the whole year
- Stonewalls rebuilt
- Tradition preserved and cleverly enhanced by new technologies
- Revitalization of karst pastures
- Young families chose settle down in Dalmatian islands
- Self sustained islands
- Local good markets (short supply chains)

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A thematic network on High Value Farming
Learning, INnovation & Knowledge

LEARNING AREA « Causses et Cévennes » (France)

A BASELINE ASSESSMENT

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Date: July 2017

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Largest context

- **South-West European territory**

Cultural Mediterranean landscapes diversity made by agropastoral activities

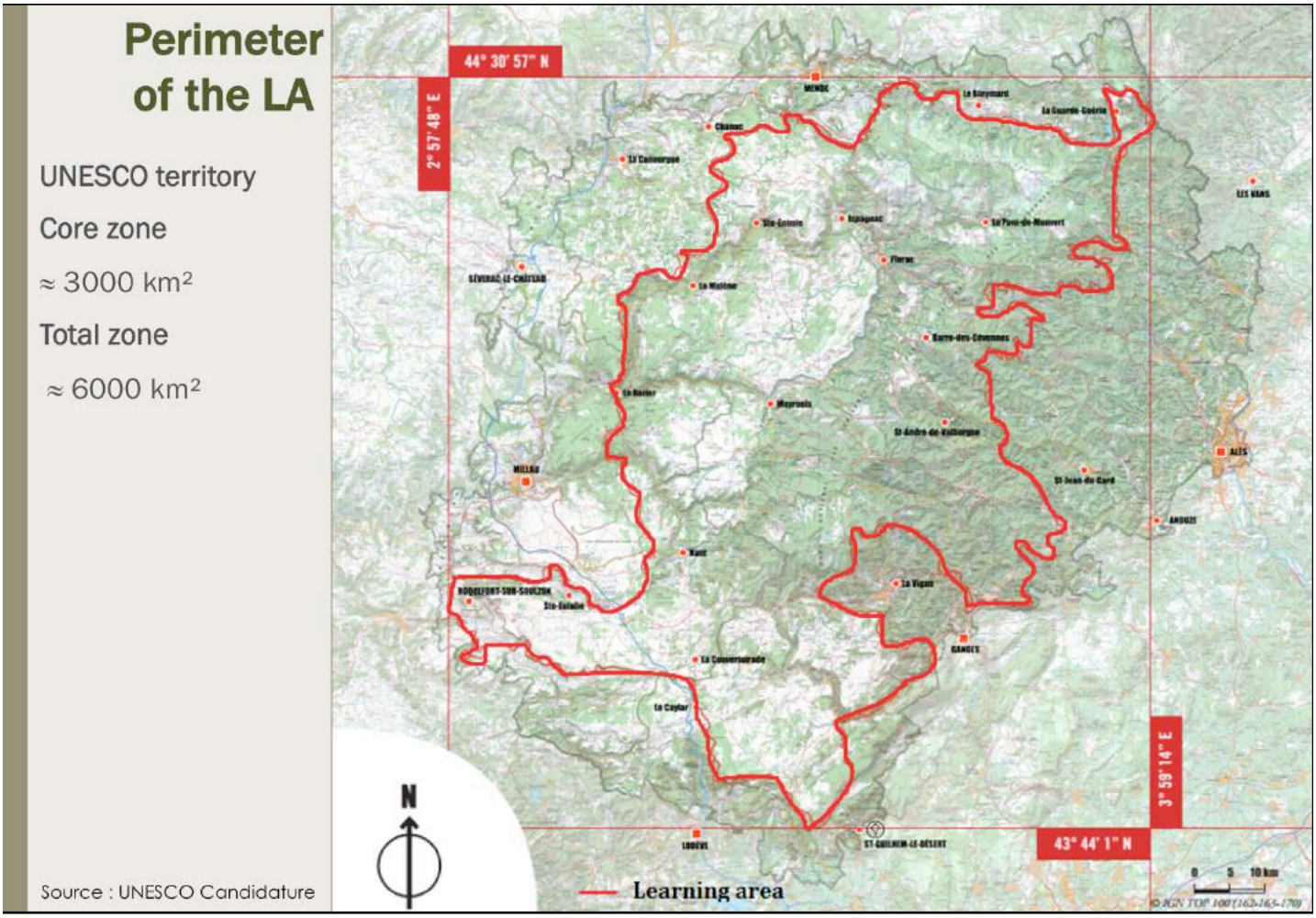
Learning area to test preservation and management policies

- **Mediterranean region** representative of a lot of types of pastoral organization
- **South-East of Massif Central**

Low mountain range

In the middle of big transhumance trails between plains of Languedoc and Massif Central

- **Eligible for Moutain Law** (*Convention Interregionale du Massif Central 2015-2020*)



The Universal Exceptional Value of the Causses and Cevennes is characterized by landscapes shaped by agropastoral activities.

The territories within the Causses and Cevennes UNESCO perimeter, are the most significant examples of agropastoralist landscapes (geological and morphological criteria, landscape unity, cultural elements, rangelands and summer pastures). The area has a strong historical identity and benefits from a complete set of protective and management measures.

The reasons for enrolling in UNESCO:

The permanence of the cultural landscapes (transhumance trails, rangelands, sheepfolds) even though some (terraces, the hydraulic system) are already relics.

Agropastoralism, the combination of extensive livestock breeding and cultivation of forage crops has always succeded in keeping the land open.

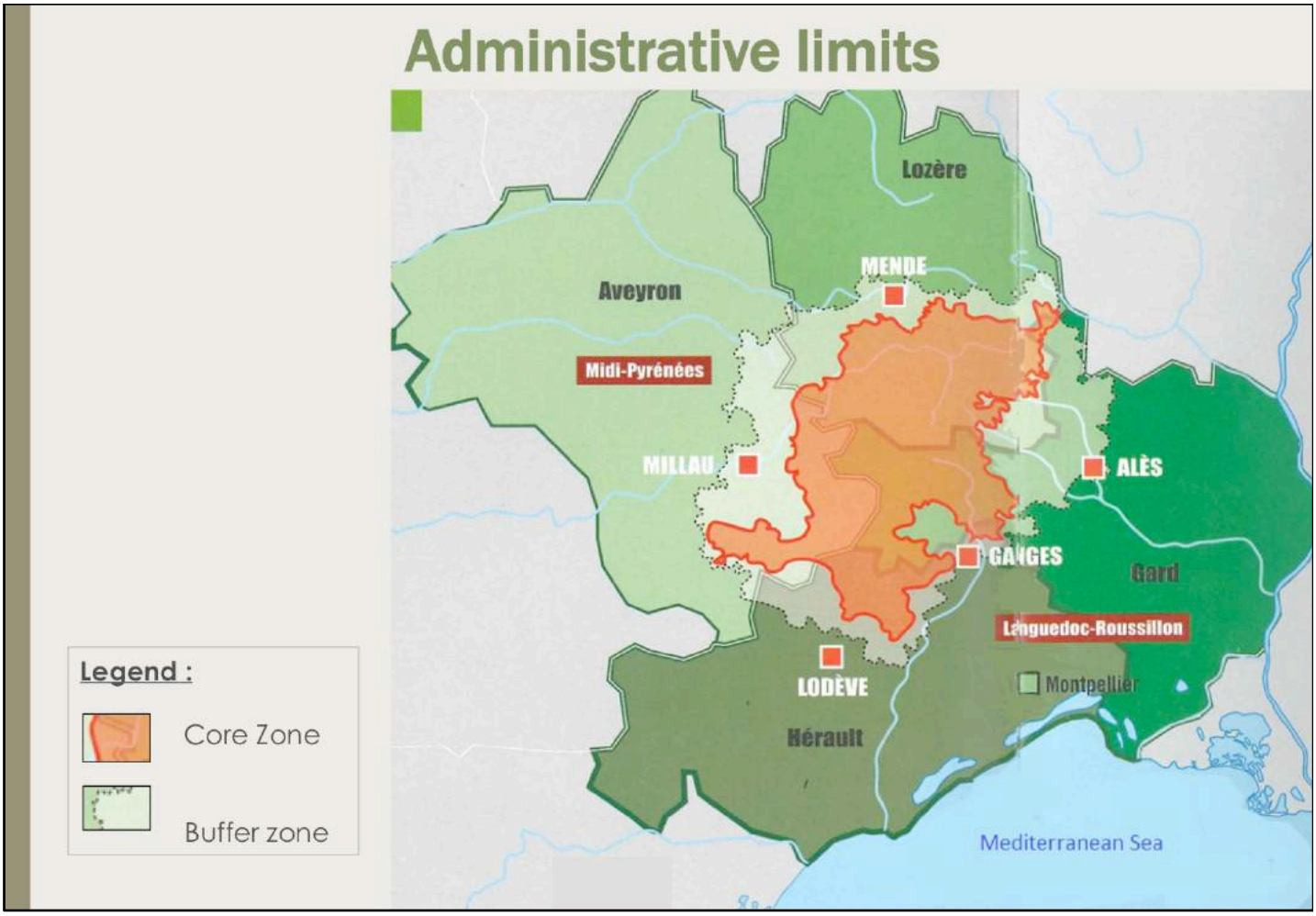
The cultural traditions are based on social structures and breeding that are adapted to the environmental constraints.

The Causses and Cevennes is a singular example of a Mediterranean basin, and is a cultural engagement for France.

Agropastorism has long characterized the Causses and Cevennes and the same pastoral practices continue to be used today, unlike in other countries in southern Europe where such practices seem to be disappearing due to changes in farming systems and to the rural exodus. In the the Causses and Cevennes, transhumance trails continue to mark transhumance territories today.

The Causses and Cevennes perimeter is to be a Learning Area in the HNV-Link project based on several features:

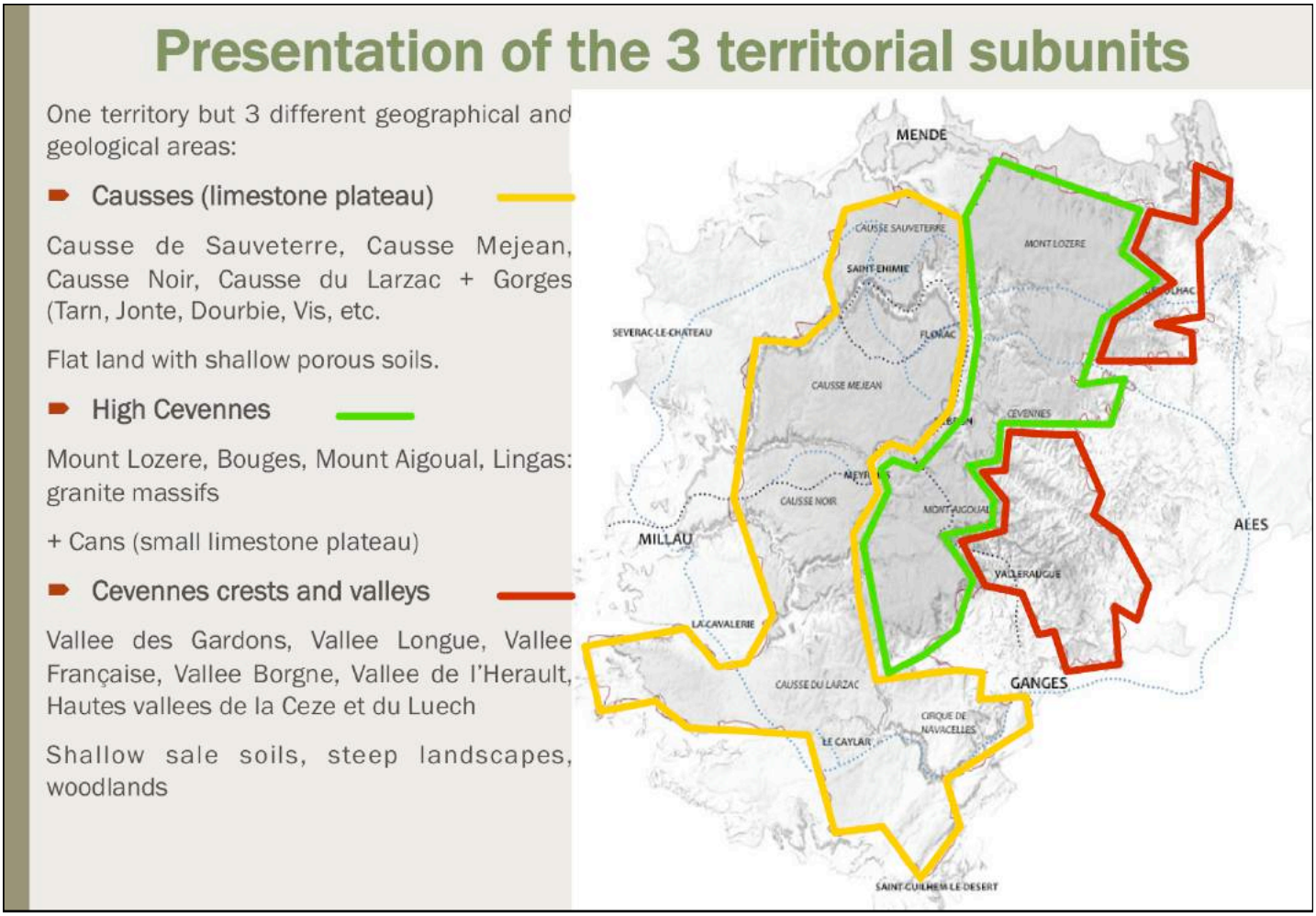
- **An innovative institutional framework** thanks to the creation of the interdepartmental agreement for the management of the Causses and Cevennes area (UNESCO).
- **Targeted agro-ecosystem and tailored agro-ecological management** (landscape ecology) linked with the actions outlined in the 2015-2021 Management Plan.
- **A management structure with several actors**: State services, local authorities, professional organizations, technical support services, research institutes and associations.



1 region (*Occitanie-Pyrenees Mediterranee*).
The Causses and Cevennes area is shared by **4 French administrative departments**: Lozere (44% of communes), Gard (28%), Aveyron (16%), Herault (12%).
Three thousand square kilometers of the area proposed for addition to the World Heritage list (the « core zone ») is made up of 123 communes.
A total of 215 communes and 6,000 km² of highlands in the southern Massif Central turned toward the Mediterranean
5 « gateway » towns: Ales, Ganges, Lodeve, Mende, Millau
8 Groups of communes (*communaute de communes* in French)
The Causses and Cevennes UNESCO territory is divided into three zones:

- **the core zone** (communes located entirely inside the core zone),
- **the core-buffer zone** (communes with part of their territory located in the core zone)
- **the buffer zone** (92 communes) located in the immediate vicinity of the core-buffer zone.

(Source AGRESTE Languedoc-Roussillon – Donnees septembre 2013).
The Learning Area in the HNV-Link project corresponds to the core and core-buffer zone of the UNESCO territory. It is the largest landscape unit on the World Heritage List in Europe.



The Causses and Cevennes form a territorial unit comprised of 3 different subunits:

Causses and Gorges: The Causses is a vast limestone plateau situated at an altitude of around 1,000 m asl, and surrounded by gorges and cliffs. The plateau is crisscrossed by lanes linking villages, farms and the sparse arable land nestling in the hollows of vast rangelands.

The **High Cevennes** are characterized by 2 main massifs :

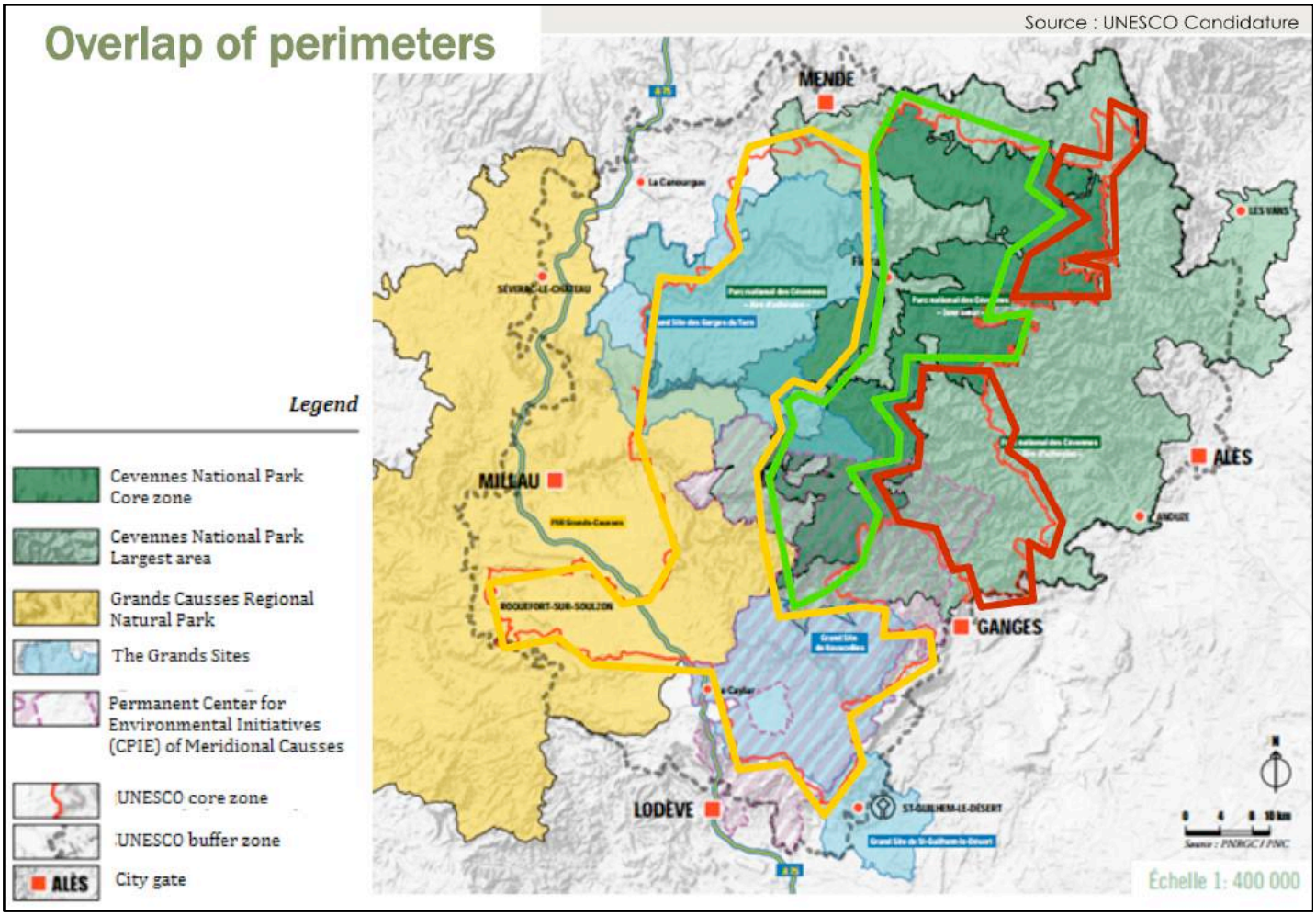
Mount Lozere in the north of the area, bordered by the Lot valley and the Altier valley in the north and by the Massif of Bouges in the south. Mount Lozere is the highest summit of the southern Massif Central.

Mount Aigoual-Lingas, in the south of the area

Cevennes crests and valleys in the eastern part of the area. The schist valleys are situated at an altitude of under 1,000 m asl, and are characterized by ridges and valleys. In some places, 95% of the land is on a slope.

The Causses and Cevennes is a mountain area with a relatively harsh (given that it is Mediterranean) climate (cold in winter, hot in summer) with summer droughts (more common in the southern part). The use of agricultural machinery is almost impossible on these arid shallow soils. Only pastoralism can flourish in such areas and counter invasion by broom, box trees, and spontaneous afforestation by pine or oak. Only man in synergy with animals, mainly sheep, are capable of preventing the transformation of the landscape (CGAAER report).

Causses	Cevennes
Catholic	Protestant
Open landscape	Woodlands
Ease of travel (increased with A75)	Enclosing cevennes valleys
Large agricultural structures	Little farms (except summer lands in the top)



<u>Recent events and key dates around the question of agropastoralism in the territory:</u>

Many protective measures apply to the Causses and Cevennes Site and management is divided between various operational bodies each if which operates in its own territory:

- **The Cevennes National Park**, a public institution including 117 communes on 321,380 hectares was created in September 1970; it is the only permanently inhabited National Park in France. It has also been a biosphere reserve since 1985.

- **The Causses Meridionaux association** was created in April 1994. The Permanent Center for Environmental Initiatives (French acronym CPIE) comprises 28 communes in the Departments of Gard and Herault. The association was certified in 2002. This Center undertakes actions in favor of sustainable development in two areas:

  Aiding territories through public policies

  Awareness raising and education of the general population concerning the environment.

- **The Regional Nature Reserve of Grands Causses** (French acronym PNRGC) concerns 94 communes and 315,949 hectares. It was created in 1995 and is managed by an association of local authorities.

- **The Tarn Gorges and Jonte sites** were extended on March 29, 2002, and now cover nearly 29,000 ha. They are classified as protected sites (French Law of 1930 for "The protection of natural monuments and sites of artistic, historic, legendary or picturesque character"). These sites are world famous; most have "three stars" in tourist guidebooks. In our area, there are 3 such sites: (i) Gorges du Tarn, de la Jonte et des Causses, (ii) Cirque de Navacelles and (iii) Saint-Guilhem le Desert, gorge de l'Herault.

Although the "Grands Sites" are very different, they face similar challenges:

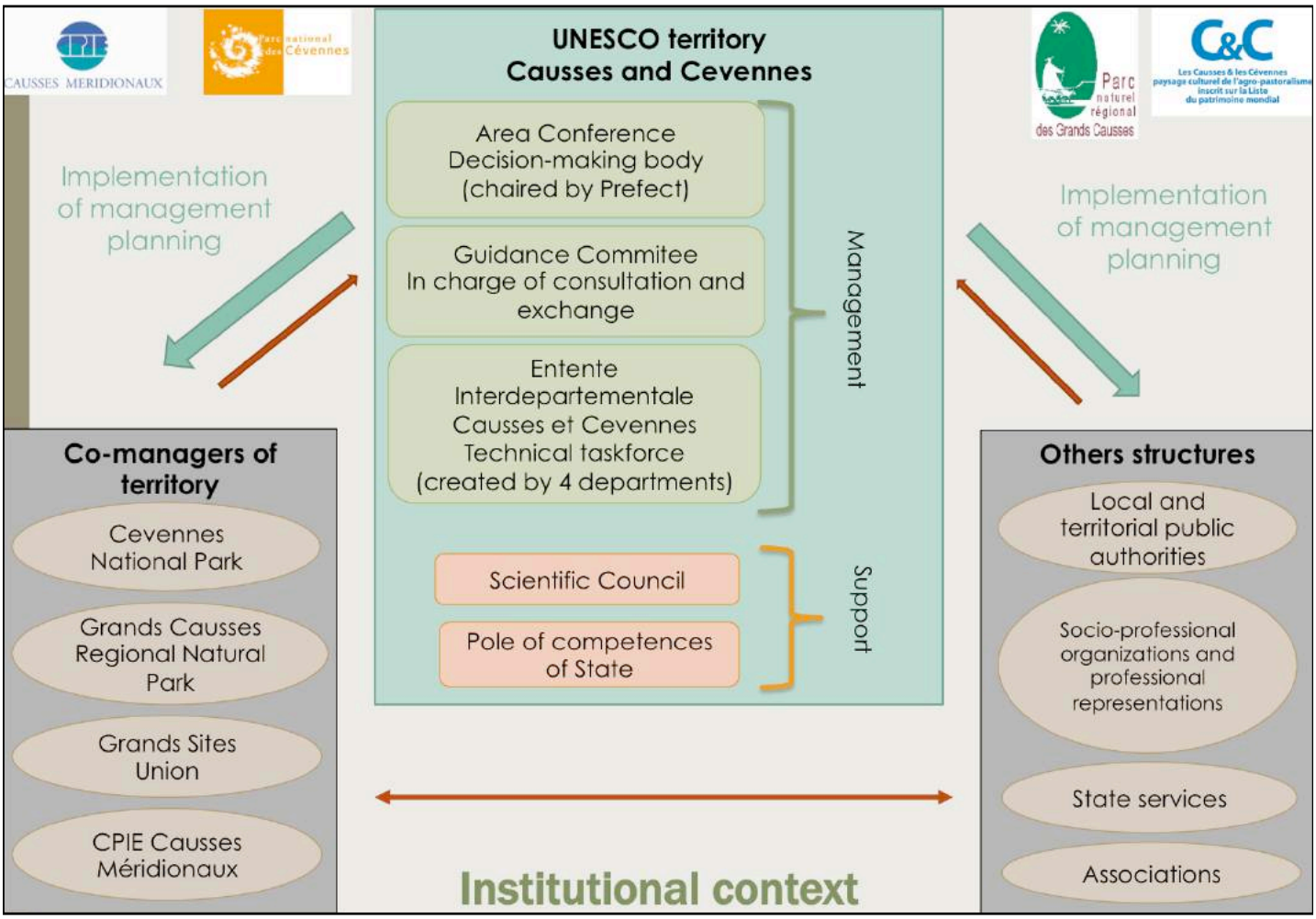
- The preservation and restoration of attractive but fragile landscapes
- The intelligent organization of the huge numbers of visitors who have to be managed and controlled
- Promoting the values of sustainable development

These challenges require active local management implemented by local organizations, such management is an indispensable complement to the regulations laid down by the state.

- **The Causses and Cevennes Site** was added to the World Heritage List, as a living cultural landscape of Mediterranean agropastoralism on June 28, 2011.

- **The governance of the Causses and Cevennes Site** was established in 2012 and the Prefect of Lozere was appointed Coordinating Prefect by the Prime Minister in January, 2013.

- **The Area Conference** approved the Causses and Cevennes 2015-2021 action plan in December 2015, and a public institution *(CGAAER)* submitted a report on the sustainability of extensive agropastoral practices in the Causses and Cevennes UNESCO territory in May 2016.



Context of the multidisciplinary governance of the Causses and Cevennes Site

After the Causses and Cevennes was added to the World Heritage List in June 2011, the State and the local authorities created a management body to guarantee the maintenance of the Outstanding Universal Value of the Site. Three authorities are involved in order of importance:

- **The Area Conference** was created on January 13, 2012, and is chaired by the Coordinating Prefect. It is the decision-making body and is responsible for defining the guiding principles for the management of the Site and authorizing actions that guarantee the Site will be well preserved.
- **The Guidance Committee** is the body in charge of consultation and exchange with all those involved locally, and is responsible for proposing guiding principles and recommendations for management of the Site. The committee comprises the Association for the Valorisation of the Causses and Cevennes (French acronym AVECC).
- **The Technical Taskforce:** (*Entente Interdepartemental*) for the Causses and Cevennes Site was created as a public institution on April 11, 2012 on the initiative of the four departments (Aveyron, Gard, Herault, Lozere).

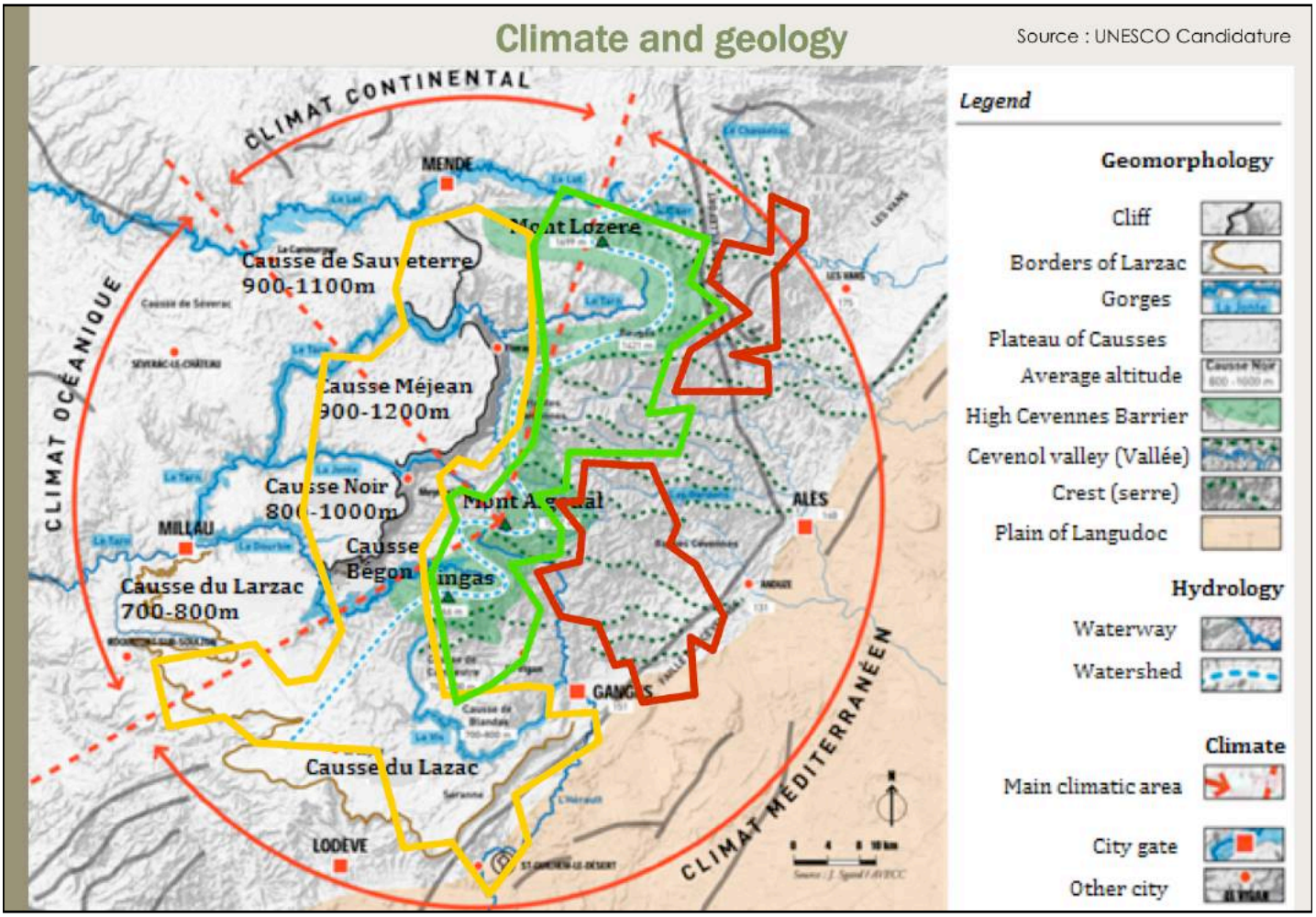
Plus two support institutions: the Scientific Council and the Pole of Competence, which includes all French departments.

For the implementation of the Causses and Cevennes Action Plan, the technical taskforce is supported by the co-managers of the territory:

- the Cevennes National Park,
- the Grands Causses Regional Natural Park,
- the « Mixed Association » of the sites « Gorges du Tarn, de la Jonte et des Causses », « Cirque de Navacelles » and « Saint-Guilhem le Desert, gorge de l'Herault »,
- the "Causses Meridionaux" association

And also by many institutions concerned with agro-pastoralism, namely:

- State services,
- public territorial authorities (The Region of Occitanie, the administrative departments) and local authorities (communities of communes, and communes, mixed associations),
- socio-professional organizations and professional representations ;
- the organizational bodies involved in Natura 2000;
- associations of a departmental nature and local associations.



Geology

The morphologic and pedological composition of the territory comprises 3 types of physical environments ranging from an altitude of 200 m and 1,700 m asl: a large limestone plateau, granite massifs and shale valleys (PnC 2010) (Duha 2011).

Climate

Like the geological characteristics, the climate differs with the subunits. The climate of the territory as a whole is Mediterranean, but some parts are influenced by a continental climate (in the north) or oceanic climate (in the west).

	Causses and Gorges	High Cevennes	Cevennes crests and valleys
Geology	Limestone plateau with deep canyons	Granitic massifs surrounded by schist and sandstone formations	Essentially shaly
Climate	Mediterranean climate. Causse Mejean and Causse of Sauveterre : under the influence of continental climate (mountain climate). Causse Noir, Causse of Larzac and Causse Begon : under the influence of oceanic climate.	Mediterranean climate. Important variability of temperature, abundant precipitations and strong winds at the top.	Mediterranean climate with cold winters, dry and warm summers and rainy autumns but with mild temperatures.

Rainfall and temperatures

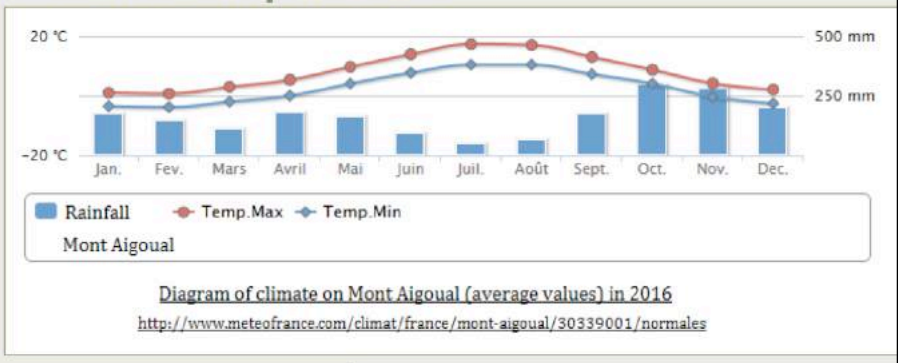


Diagram of climate on Mont Aigoual (average values) in 2016

http://www.meteofrance.com/climat/france/mont-aigoual/30339001/normales

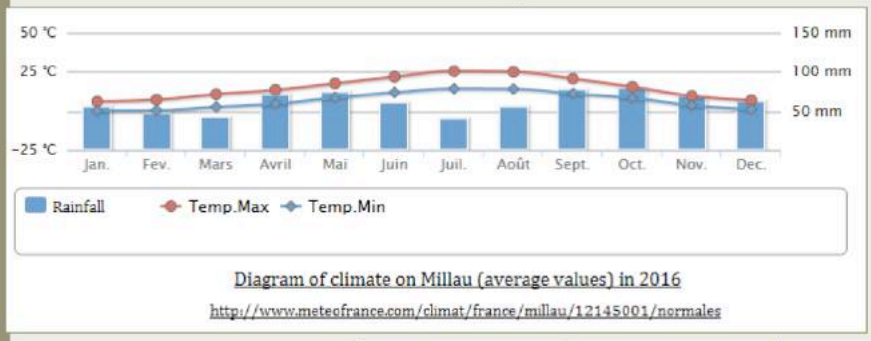
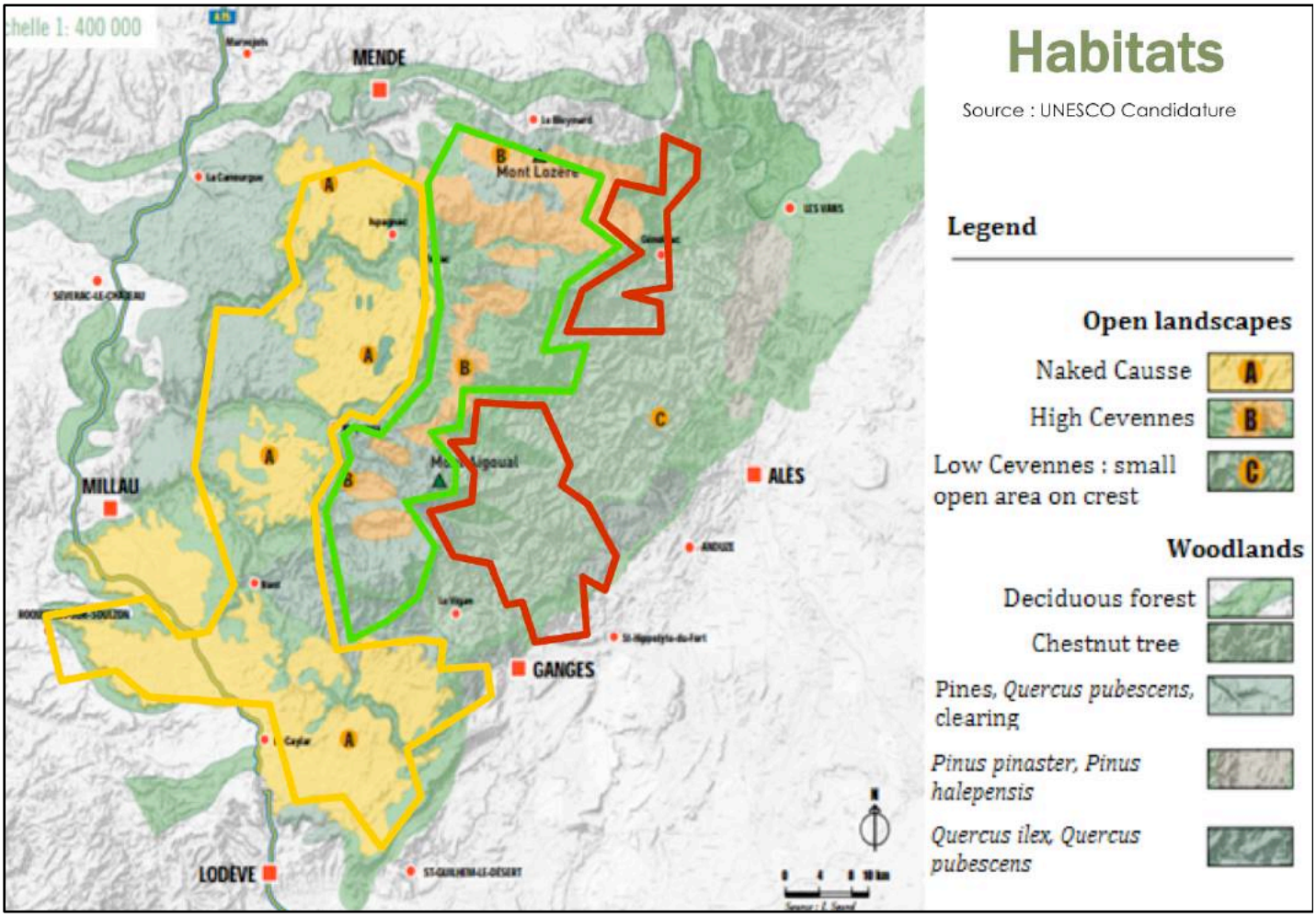


Diagram of climate on Millau (average values) in 2016

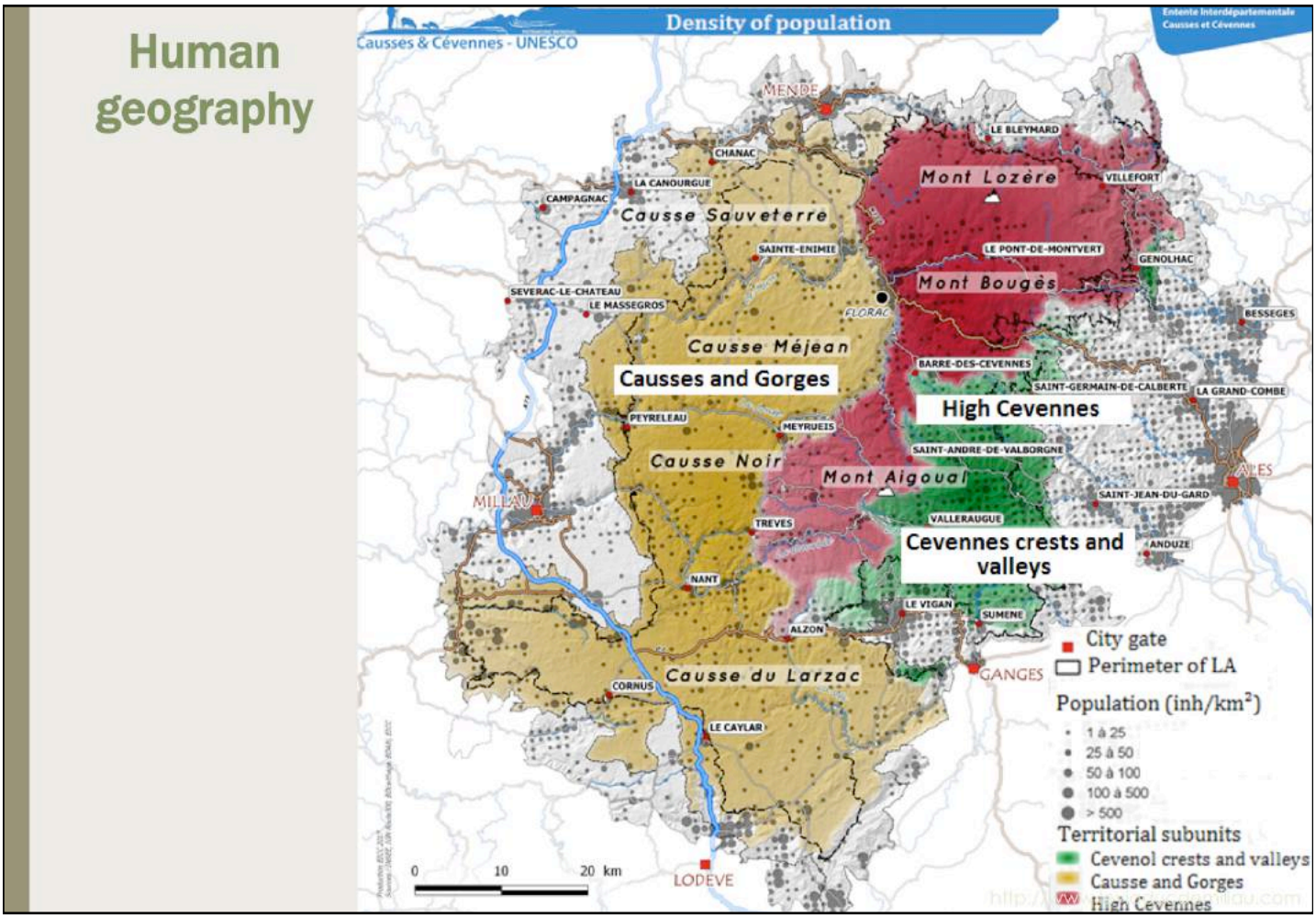
http://www.meteofrance.com/climat/france/millau/12145001/normales

Station	Annual Temp. Min. (1981 – 2010)	Annual Temp. Max. (1981 – 2010)	Annual Rainfall (1981 – 2010)	Days per year with rain (1981 – 2010)
Mount Aigoual	2,7 °C	8,0°C	1931,7 mm	126,5 days
Millau	6,8 °C	15,1°C	731,6 mm	94,5 days

Mount Aigoual is the coldest weather station in the Learning Area, and also one of the coldest in France.
Rainfall is heavy in spring and in autumn, notably during what are called 'Cevenol events', with heavy rains and flooding in the Cevennes and the Cevennes foothills.
A Cevenol episode lasts several days and between 200 and 400 mm of rain can fall during the period.
The temperature is relatively cold in winter (around 0°C in January in Millau) and warm in summer (around 22 °C in July in Millau).



	Causses and Gorges	High Cevennes	Cevennes crests and valleys
Vegetation	2 types of limestone plateau : - Naked Causse (steppe with rough grazing and rough grazing with brometalia) - Wooded Causse (plantation of conifers, mainly Pinus nigra)	Mount Lozere and Mount Bouges = open environments (rough grazing at high altitudes, heathlands, damp areas, fallen rocks and hardwood and softwood woods). Mount Aigoual = 80% forest cover with some open areas (heathlands, rough grazing with Nardus stricta).	More than 2/3 of the area is wooded (mainly with chestnut) with some heathlands and rough grazing.
Main habitat types	Steppe with rough grazing, cultivated area, rangelands on calcareous soil, pine forest and beech forest	Mountain grassland, damp grassland, rough mountain grazing, damp rough grazing, heathland with Calluna vulgaris or Citisus scoparius/ oromediterraneus, Pinus sylvestris forest, beech forest	Grassland in the valleys, rangeland on silica with Erica arborea, Genista, Cytisus scoparius; oak forest, chestnut forest



According to the 2014 census, the population of the Causses and Cevennes area was 42,300 in the core zone and 151,000 in buffer zone.

Territorial subunits	Inhabitants	Inhabitants/km²
Causses and Gorges	18 116	7,8
High Cevennes	4 873	4,7
Cevennes crests and valleys	11 345	17,2

The Learning Area is composed of the core zone of the Cevennes National Park and almost the entire buffer zone. The National Park is the only one in metropolitan France to be permanently occupied, (74,000 inhabitants in 2006).

Since the 1970s, positive population dynamics have prevailed in the Causses and Cevennes territory, notably because of the the arrival of 'neo-rural' people* in the Cevennes. The population of those who live on the Park territory has increased since the 2000s, with an annual 0.7% increase in population (3,400 additional inhabitants between 1999 and 2006).

The Cevennes crests and valleys are more densely populated than Causses and the Gorges and the High Cevennes.

The road network comprises the A75 highway, which crosses the Larzac Causses and includes the famous Millau viaduct, two main roads (N106 southwards and N88 cross the Lozere) and a dense secondary network.

The departmental road network was built on the plateau and in the gorges starting in 1880 (the Jonte, Gorge of Tarn, South of Languedoc roads among others.)

Railroad lines were also built to facilitate export of Roquefort cheese and gloves manufactured in Millau, but the local transport network has remained fairly small. Currently, apart from the big highway A75, the Causses and Cevennes area has no highways or direct roads, so it is still difficult to travel in Cevennes valleys.

***Neo-rural people** = *urban people who decided to move to rural areas.*

Agropastoralism: traditional Mediterranean system based on extensive grazing.
In-place economy: convenience stores, short marketing circuit for agricultural products (meat, milk, leather, wool, sheep manure called *migou**, other manure, fruit, vegetables, etc.), slaughterhouses (Ales, Le Vigan), activities for tourists.
Local crafts: pottery, Anduze jars, glass, ceramics, leather, dry stones, lauze, flagstones.
Tourism: mainly focused on the gorges and waterways. There is a will to promote sustainable tourism.
Wilderness activities: cycling, hiking, horse trekking, water sports (canoe, kayak, canyoning), climbing, caving, winter sports (skiing, snowshoes, sledge), archery, observation of fauna and flora, picking. The main hiking trail is Stevenson's trail (GR70) from Le Puy en Velay to Ales (Haute-Loire, Ardeche, Lozere and Gard).
Hunting: control of populations of big game.
Fishing: the variety of waterways and aquatic biodiversity ensure good quality recreational fishing.
Forestry: timber, wood for industrial purposes, firewood.

**** Migou** = dried sheep's droppings collected in the summer mountain pastures to be sold to people as garden manure.*

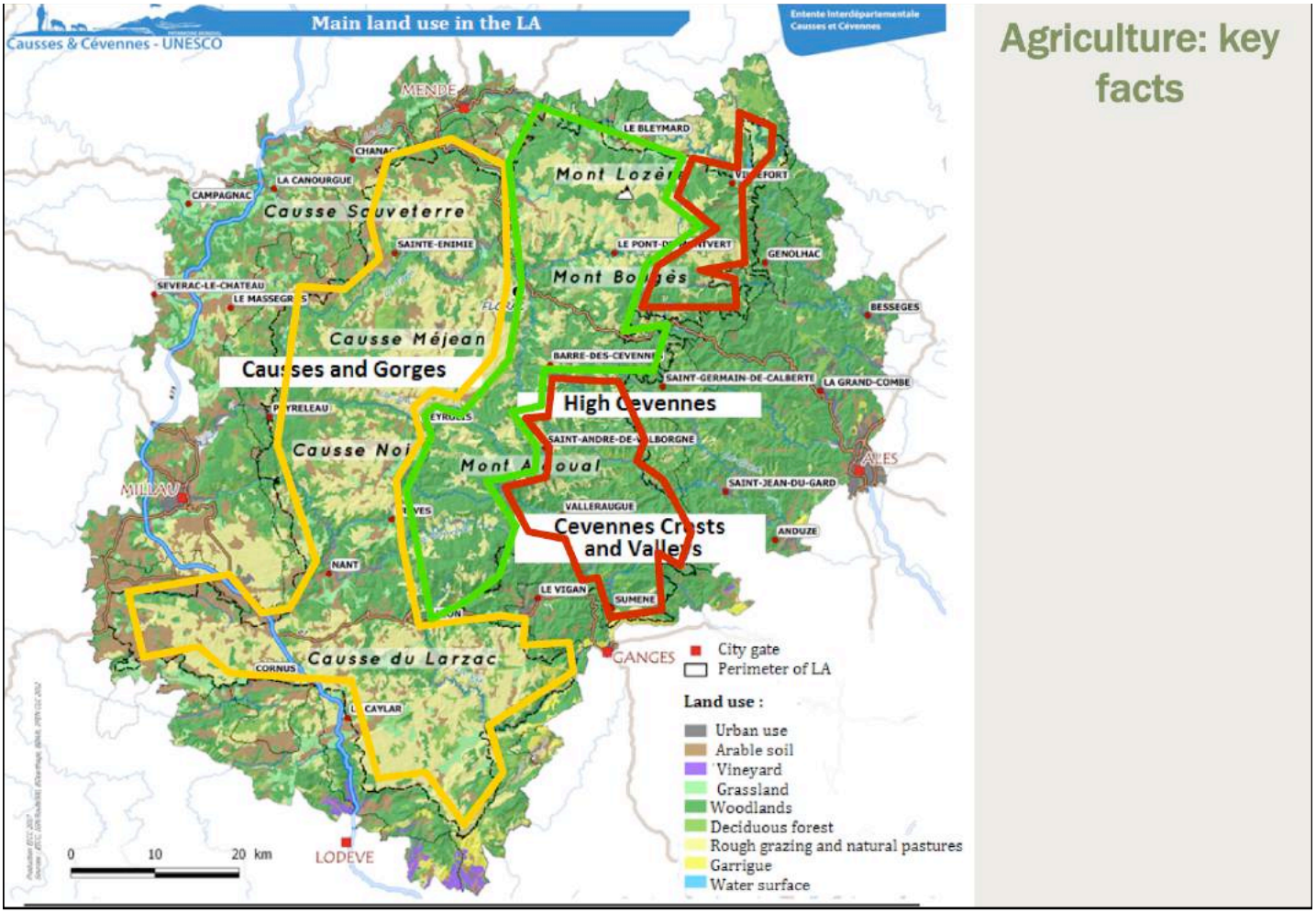
Main attributes to be preserved and managed on agropastoralism

- « **Drailles** » : transhumance trails
- **Built heritage:** sheepfolds, (« *jasse* »), artificial piles of stones (« *clapas* »), roof cisterns, terraces, walls, shepherd's shelters (« *cazelle* »), stone houses and hamlets, churches, religious symbols including stone crosses.
- **Hydraulic network (in Cevennes crests and valleys):** network of dams (« *païssieres* »), network of canals (« *beals* »), « *trancats* » to protect against running out of water, « *robina* » to protect the terraces, « *rascaças* » to control torrents and « *gorgas* » to store water
- « *Lavogne* » : dew ponds

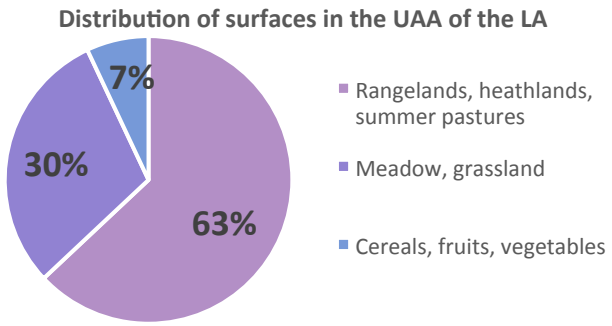
Jasse or sheepfold (source : dossier de candidature UNESCO)

Lavogne or dew pond (source : publication Causses & Cevennes)

Toit citerne or roof cistern (source : PNRGC)



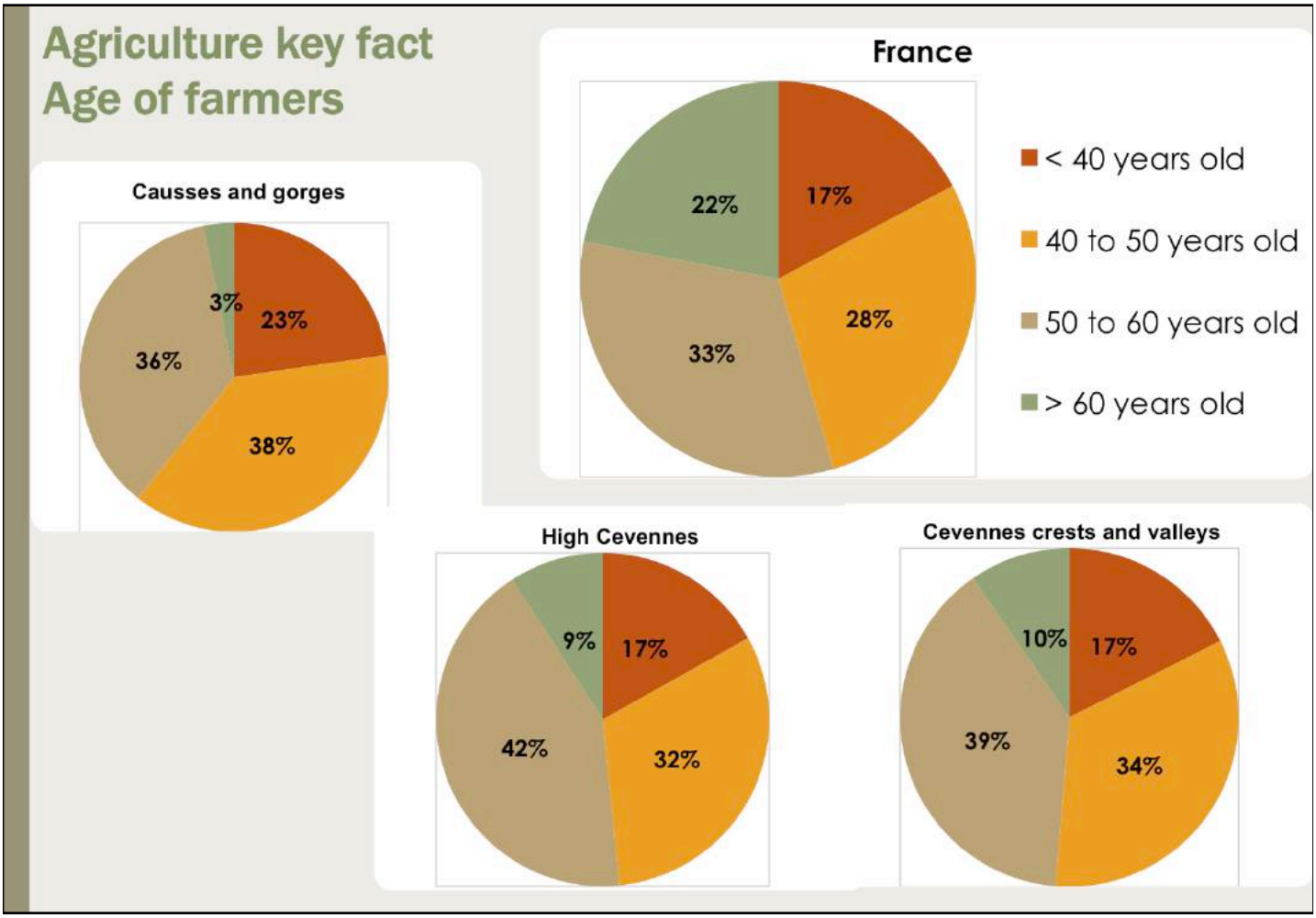
A total of 1,400 farms (in the core zone: average Utilized Agricultural Area is 200 ha in the Causses but only 50 ha in the Cevennes valleys).
Mainly livestock farms (70% of the farms located in the LA).
Causses: highly specialized in livestock breeding.
Cevennes crests and valleys: more diverse productions.
Utilized Agricultural Area = 155,000 ha (50% of total area)



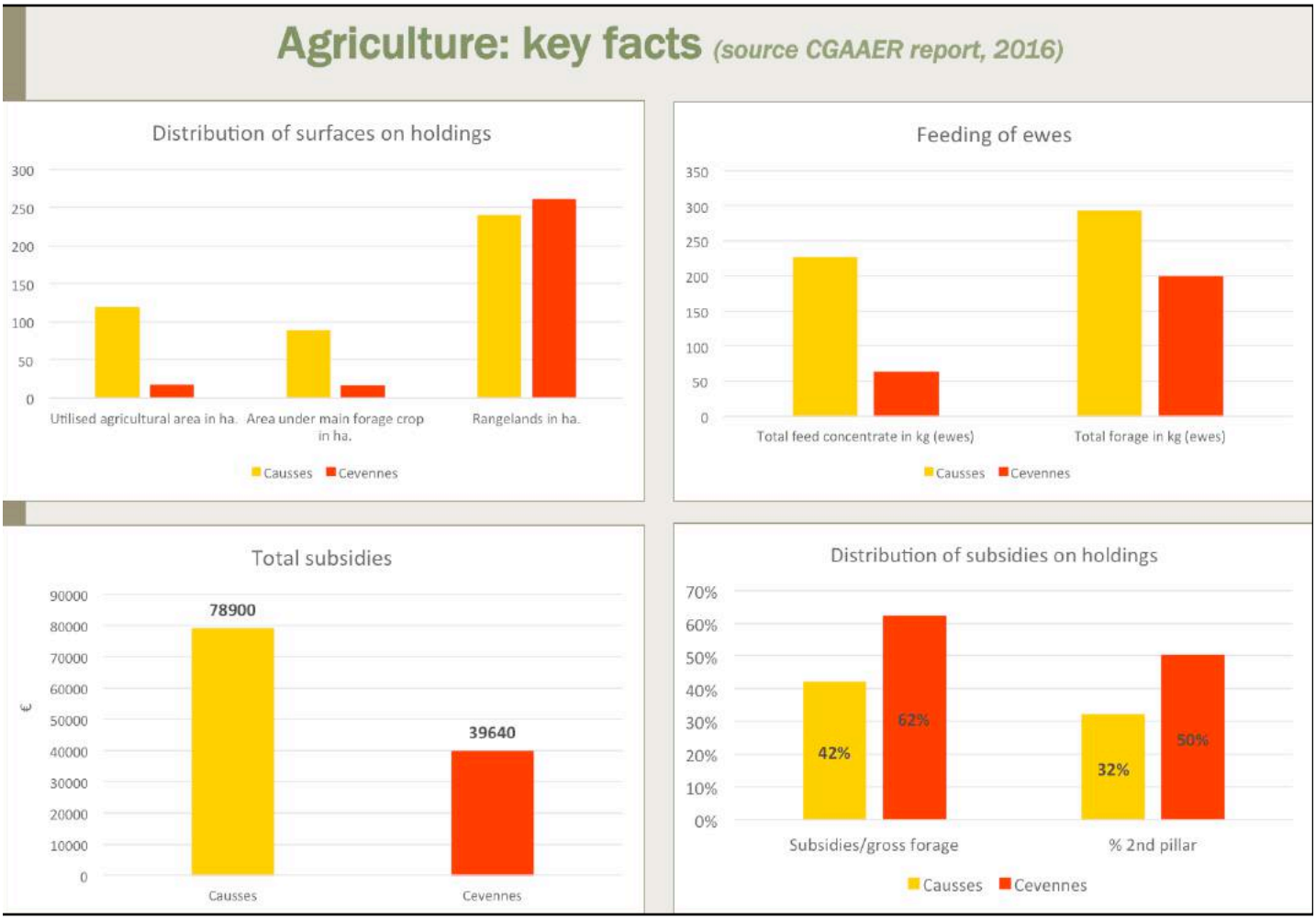
Transhumance concerns a small portion of the territory, 6,000 ha, or less than 4% of the utilized agricultural area, most of which is in the High Cevennes (Mount Lozere and Mount Aigoual).
On average, 80% of each farm is utilized agricultural area and the remainder is woodlands and heathlands but in the Cevennes valleys, woodlands account for 62% of the total area.
Agriculture occupies a little more than one third of the Causses and Cevennes area, including a big forest in the Cevennes.
Cereals cultivated are barley, triticale and common wheat in the Causses. Market gardening (especially mild onions with an AOC label) and orchards (especially apples and chestnuts).
The majority of livestock farms raise grass-eating animal, above all sheep. Between 2000 and 2010, there was a reduction in the total number of farms: the number of big farms remained the same, but there was a reduction in the number of the small and medium size farms.

Evolution of animal number	Sheep	Cattle	Horse	Goat	Land under permanent grass	Forage production
2000 - 2010	+ 5,4%	+ 60%	+ 115%	- 30%	+1% (+ 2000ha)	+ 23%

The agropastoral systems differ in the Causses, the High Cevennes or the Cevennes valleys (see below).
Transhumance concerns a hundred sheep farmers, who send their flocks, totaling 20,000 ewes in all, plus cattle, to about 20 collective summer pastures. They stay there from June 15 to the end of summer (August 25 – September 15). Transhumance is the most protected form of pastoralism, the animals are under full guard, and is the focus of popular summer festivities.

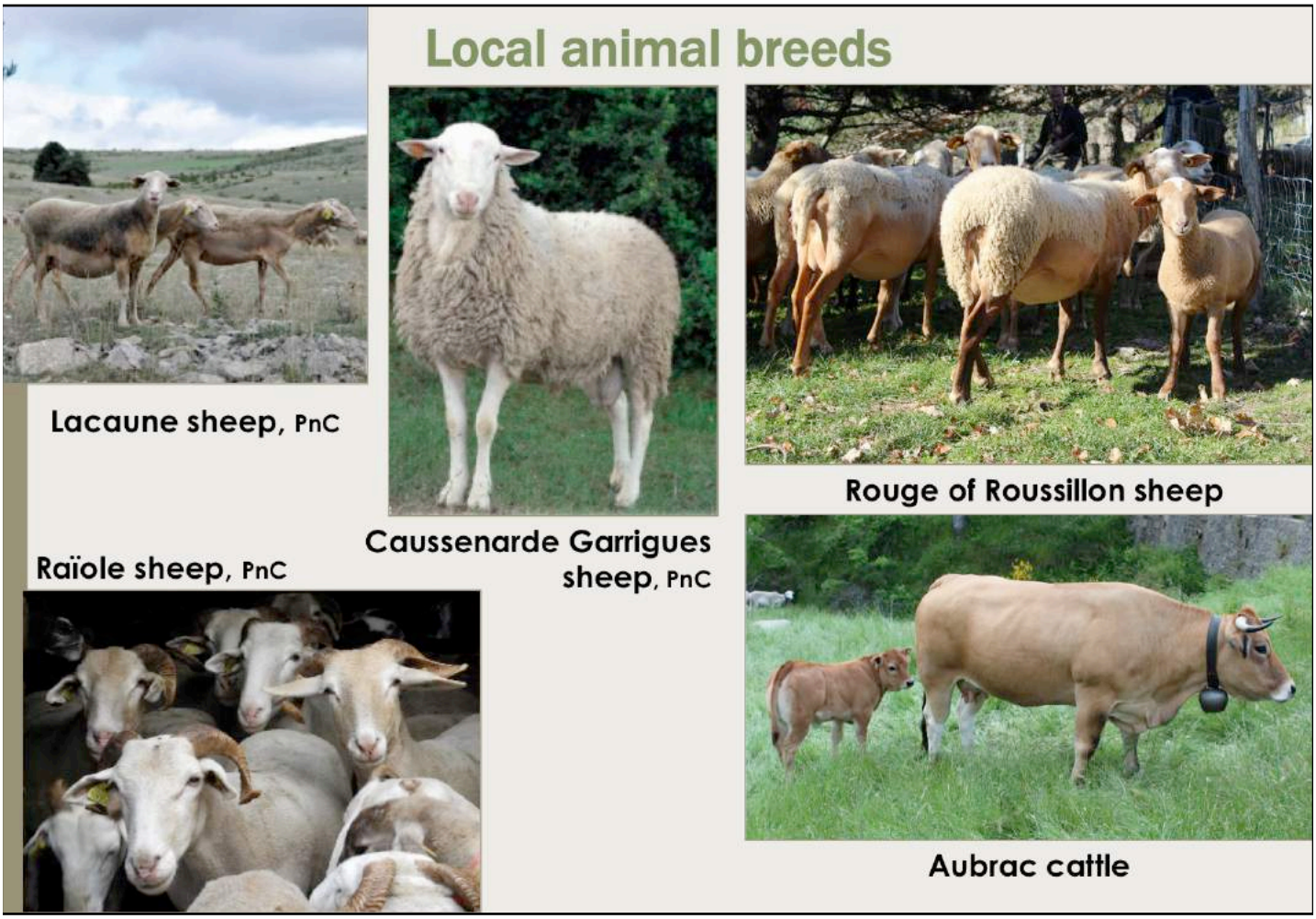


Farmers are generally younger than at national level, as farmers under the age of 50 are far more numerous than at the national level. The percentage of farmers under 60 is only 4%.
In the LA, farmers are older in the Cevennes crests and valleys and younger on the Causses.



We can see differences between Causses and Cevennes in the structure and financial results of farms. Globally, farms in Cevennes are smaller, so they have a lower income but they have really pastoral systems with using rangelands.
The table below is taken from a prospective study by the Institut de l'Elevage, 2015 (11 holdings on Causses, 5 in Cevennes),

Average value per farm	Causses	Cevennes
Utilised agricultural area in ha. **Area under main forage crop in ha.** **Rangelands in ha** **Livestock with summer lands** **Sheep fold** **Sheep/ha used**	119 ha 88 ha 240 ha 0/11 745 1,74	17 ha 16 ha 261 ha 4/5 310 1,04
Total production in kg (ewes) **Total feed concentrate in kg (ewes)** **Total forage in kg (ewes)** **Balance of food for ewes**	25,6 kg 226 kg 292 kg 103 €	9,5 kg 63 kg 199 kg 39€
Gros operating surplus/labor unit **Total subsidies** **Subsidies/gross product** **% 2nd pillar** **Kg carcasse/labor unit**	36 800 € 78 900 € 42% 32% 9 035	28 970 € 39 640 € 62% 50% 2 600
Characteristics of livestock raising	Intensification and high investment costs. High animal and labor productivity. Heavy lamb production. Big flocks.	Savings on inputs. Simplified organization of reproduction. Production of light lambs. Most food provided by grazing, a lot of time is required to guard the animal (shepherds). Difficult to build fences. Size of folds is limited.
Level of income	Income higher than in the Cevennes and less dependant on subsidies.	Low income and high dependance on subsidies.



The LA has its own local breeds that are particularly well adapted to the territorial specificities:

Lacaune dairy sheep: present around the town of Roquefort, their milk is mainly used for Roquefort cheese, they are well adapted to grazing rangeland. In 2010, there were 1,300,000 Lacaune sheep in France (20% of the national sheep herd)

Raïole mutton sheep: breed originating from the Cevennes, these sheep eat chestnuts and holm oak acorns all winter long and are transhumed to summer pastures on Mount Aigoual or Mount Lozere. The breed also produces good quality wool. There are almost 2,000 Raïole today.

Caussenarde Garrigues mutton sheep: spend the winter on scrublands (*garrigue*s) in the Herault department and summer in the Mount Aigoual or Mount Lozere summer pastures. There are around 1,800 Caussenardes Garrigues today.

Rouge of Roussillon mutton sheep: these sheep are mostly sedentary, well-adapted to a warm climate and are good mothers. There are around 6,000 Rouge of Roussilon today.

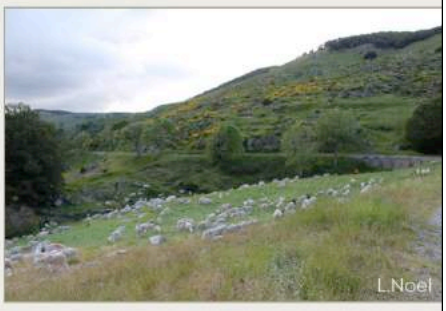
Aubrac cattle: these strong cattle are well-adapted to the relatively harsh climate and produce good quality meat. In 2010, there were 165,000 Aubrac cattle.

Goats used to make Pelardon cheese are mainly Alpine goats, but this is not a local breed.

The diversity of the LA favors local breeds because they are well adapted to particular conditions (summer pastures, *causses*, scrublands, woods, etc.).

Agro-pastoralism activities :

- Causses and Gorges:
  - Dairy sheep for milk production (Roquefort)
  - Mutton sheep for lamb production without transhumance
  - Mutton sheep for lamb production with transhumance from southern Languedoc
  - Cows for milk or meat production
- High Cevennes:
  - Transhumant sheep flocks or cow herds from southern Languedoc in summer (May 15 to October 15)
- Cevennes crests and valleys:
  - Mutton sheep for the production of light lambs (15-25 kg live weight)
  - Goats for milk production to make Pelardon cheese
- *Other forms of HNV agriculture in the Learning Area:*
  - *Chestnut production*
  - *Non intensive orchards (apple, pear, peach, apricot, cherry, etc.)*
  - *Market gardening on living soil*
  - *Beekeeping*
  - *Other forms of organic farming or integrated farm management*



The livestock sector is structured for marketing into:

Beef cattle: production of grass-fed calves for Italy.

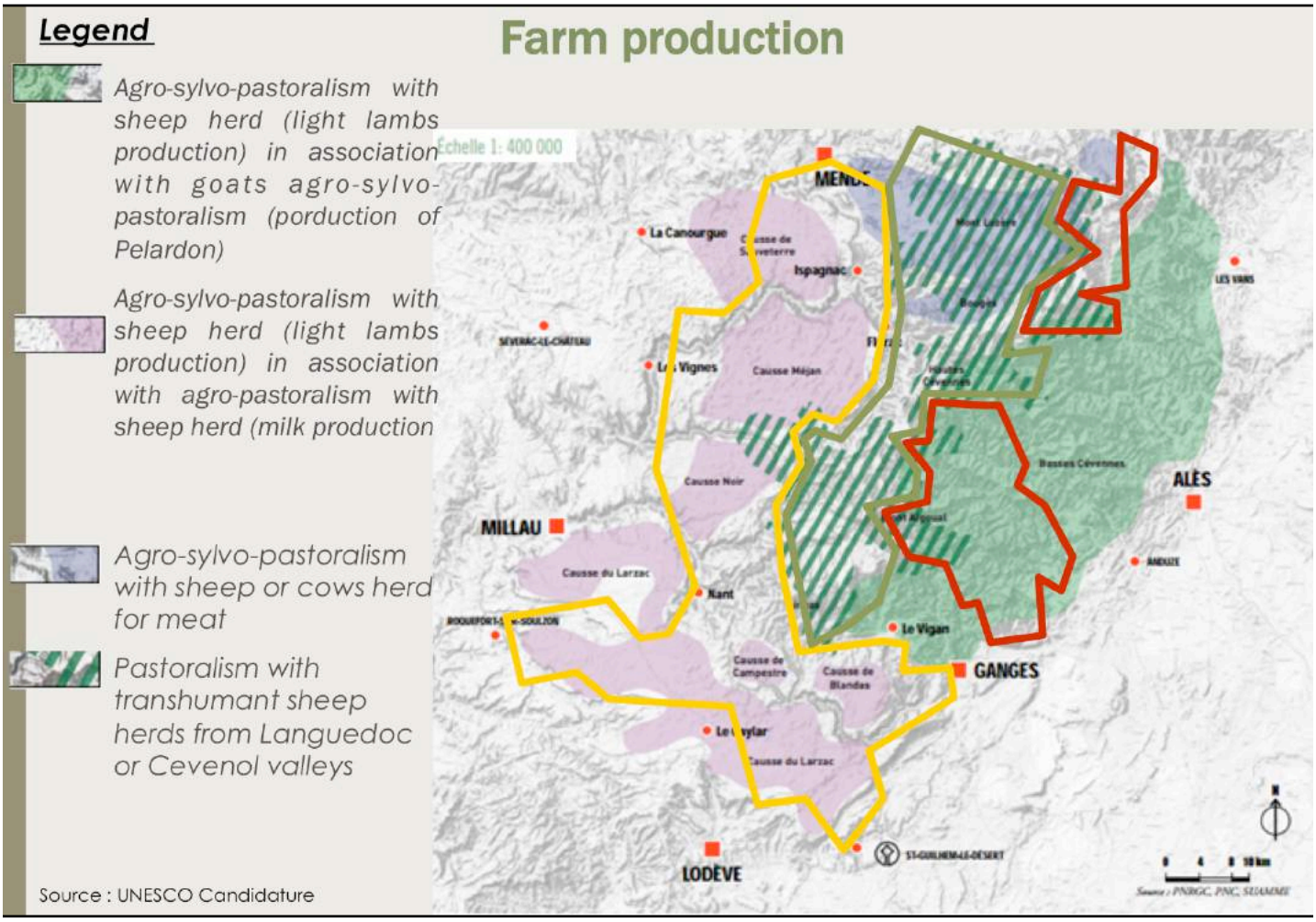
Dairy sheep: production of Roquefort and other cheeses like Le Fedou, Perail, etc.

Dairy goat: production of Pelardon cheese for the local and national market.

Mutton sheep: production of light lambs (15-25 kg live weight) to be fattened in feeding centers, or of heavy lambs for the local market.

Some of these emblematic products have a French Label (AOC), or European Label (AOP and IGP). These labels are awarded based on the respect of strict specifications that impose grazing at certain times of year (number of grazing days per year) and, in this way, help manage and protect the cultural landscapes of Mediterranean agropastoralism. These include AOP Roquefort (cheese), AOP Bleu des Causses (cheese), AOP Pelardon des Cevennes (cheese), IGP Agneau de Lozere ELOVEL (lamb).

In the LA, pastoral farms often combine farming activities with agri-tourism, market gardening, fruit production, etc.



Causses and gorges:

The Causses are characterized by large farms (on average between 162 and 200 ha in the core zone). Most are dairy sheep farms (400 farms with on average 372 sheep), milk is sold to make Roquefort cheese (50%) and other cheeses: Perail, Fedou, Salakis. There are also mutton sheep farms (240 farms with on average 218 sheep) that have a sedentary herd with lamb production sometimes combined with another agricultural activity. Some transhumant herds from southern Languedoc are taken to graze on the Causses plateau in summer. Finally there are also some cattle farms (330 farms), dairy and beef cattle (Aubrac cattle) on the fringes of Causses, in the areas with the most rainfall.

Cereals produced in « *doline** » are used to feed sheep.

High Cevennes :

Here, there are mainly transhumant flocks of sheep or herds of local breeds of cows from the Cevennes crests and valleys or from southern Languedoc (transhumance on the hoof).

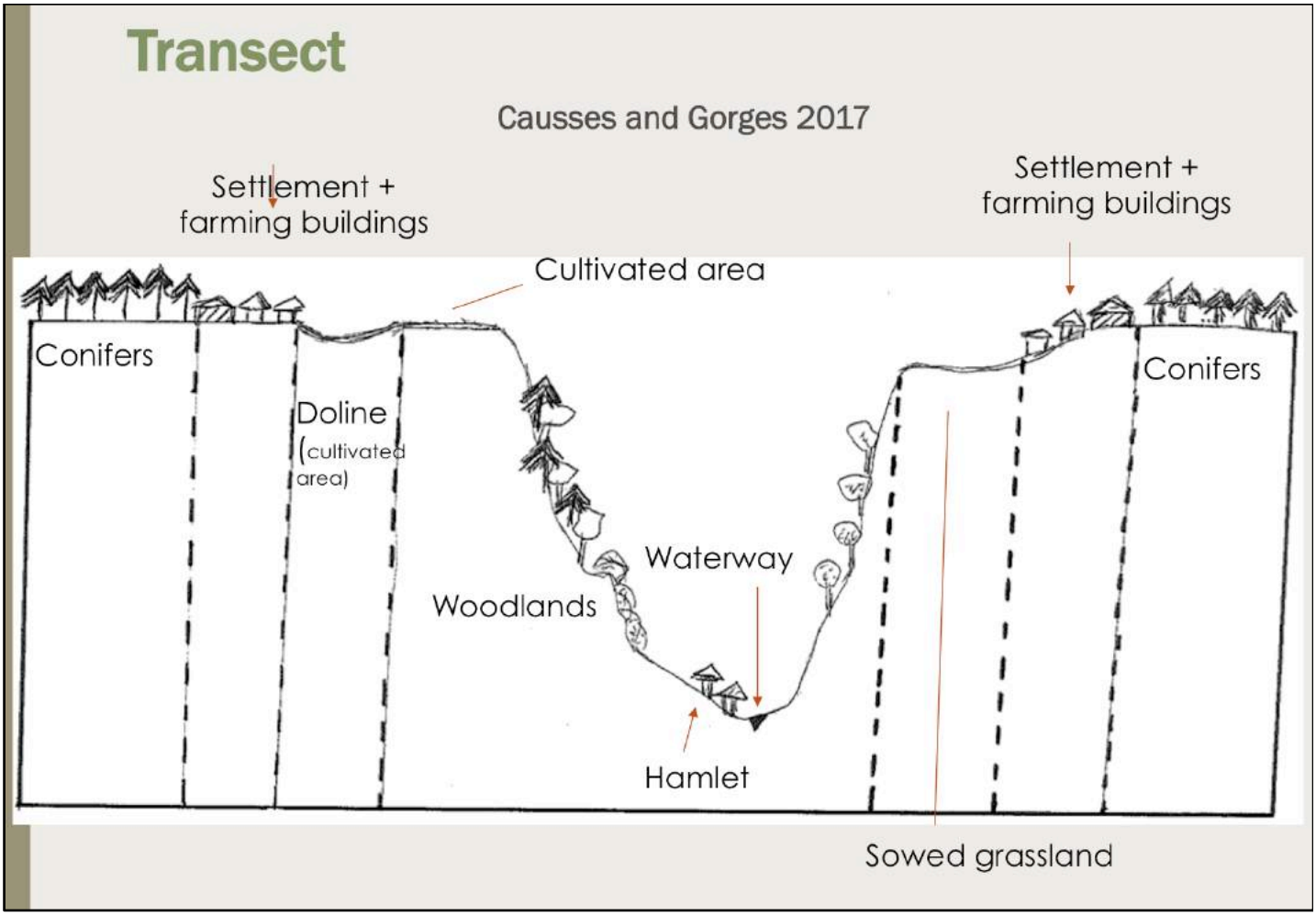
Cevennes crests and valleys:

The Cevennes valleys farms (which cover an average of 23 ha and 50 ha in the core zone) are almost unstructured and more diversified.

Mutton sheep are raised on 30% of the farms (85 sheep) for the production of light lambs, often combined with another agricultural activity. The sheep are often sent to summer pastures on Mount Aigoual or Mount Lozere. Dairy goats are raised on 20% of the farms (52 goats) to make Pelardon cheese. There are also cattle farms (20% of farms) and horse farms (8% of farms). The rest is market gardening and wine growing.

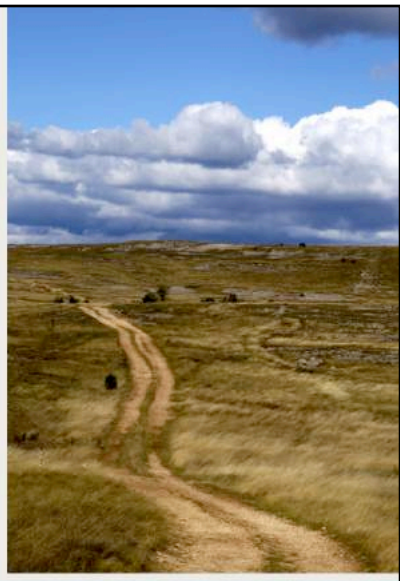
(Source : CGAAER report, may 2016)

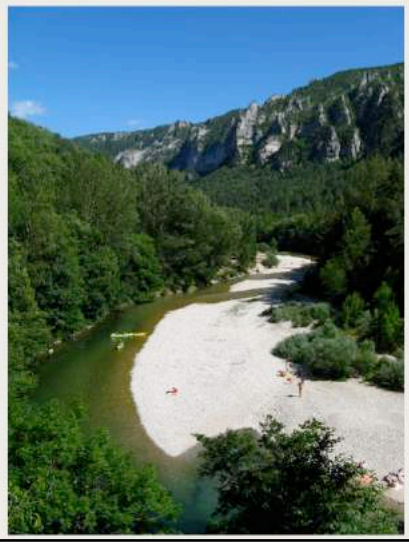
**Doline* = *sediment filled calcareous depression used to cultivate crops.*

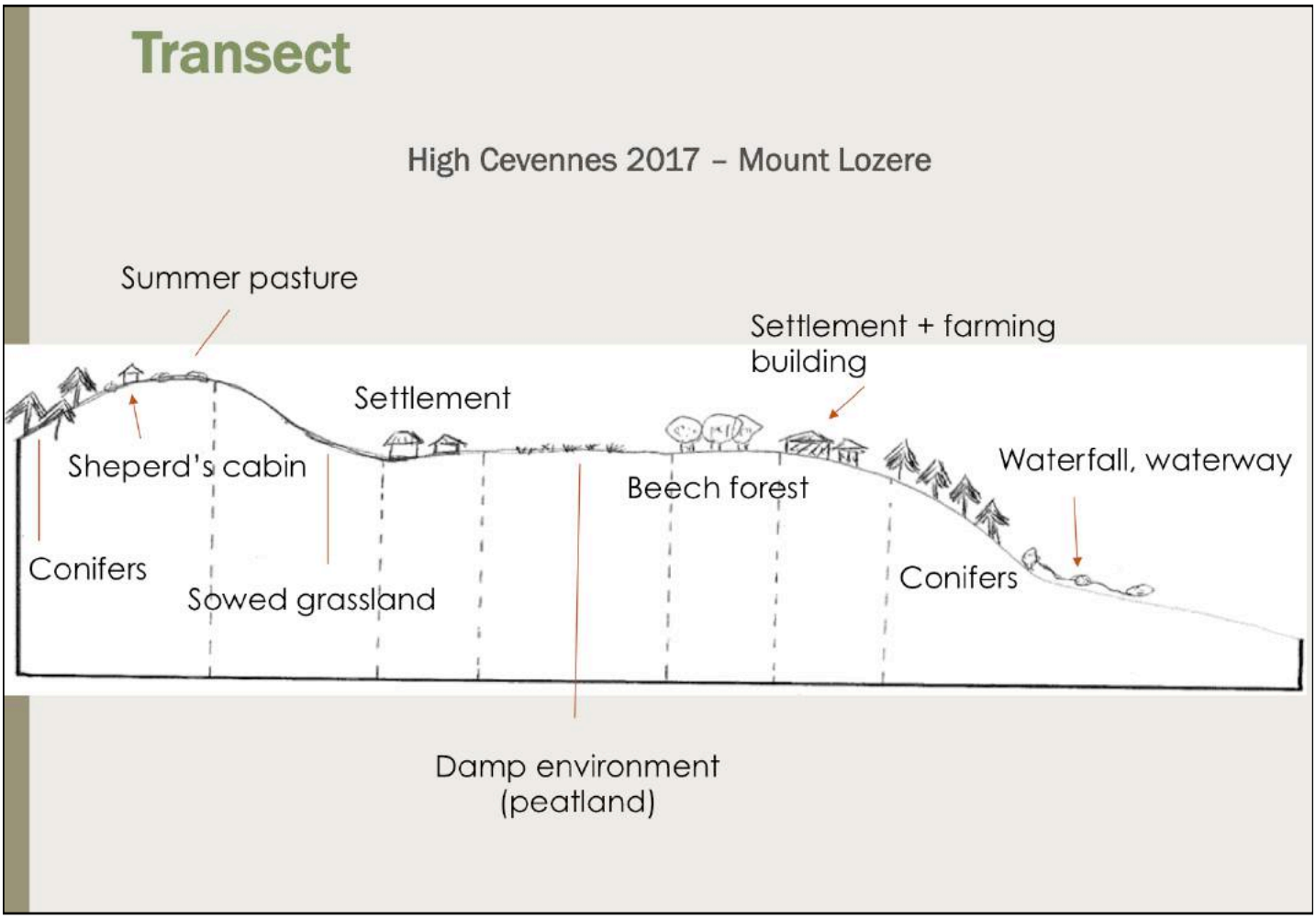


The Causses landscapes are currently characterized by the progression of conifer forests although rough steppe-like grazing land is still very present. In the most favorable areas, agricultural activities are concentrated on cereal crops or sowed pastures. The gorges are wooded with broad-leaved trees on steep slopes. Settlement is scattered.

Landscape – Causses and Gorges







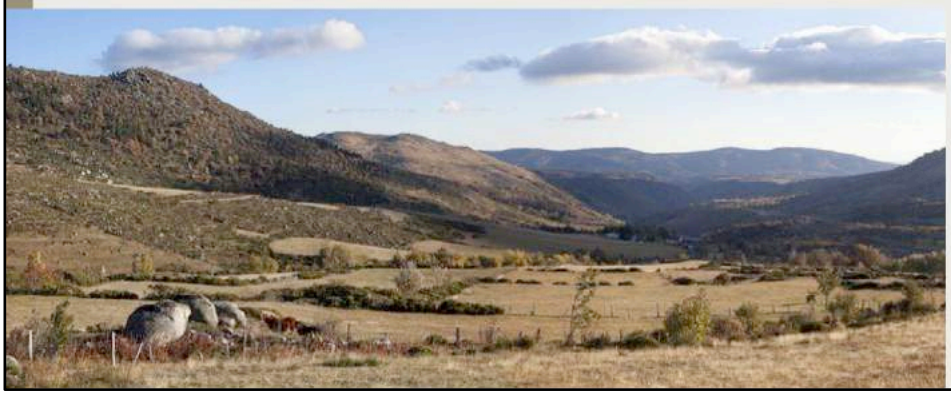
The High Cevennes are characterized by large extents of rough grazing used as summer pastures with shepherd's cabins. However conifer woods are gaining over pastoralism. Except for some scattered houses, settlement is grouped in valley bottoms next to water courses.

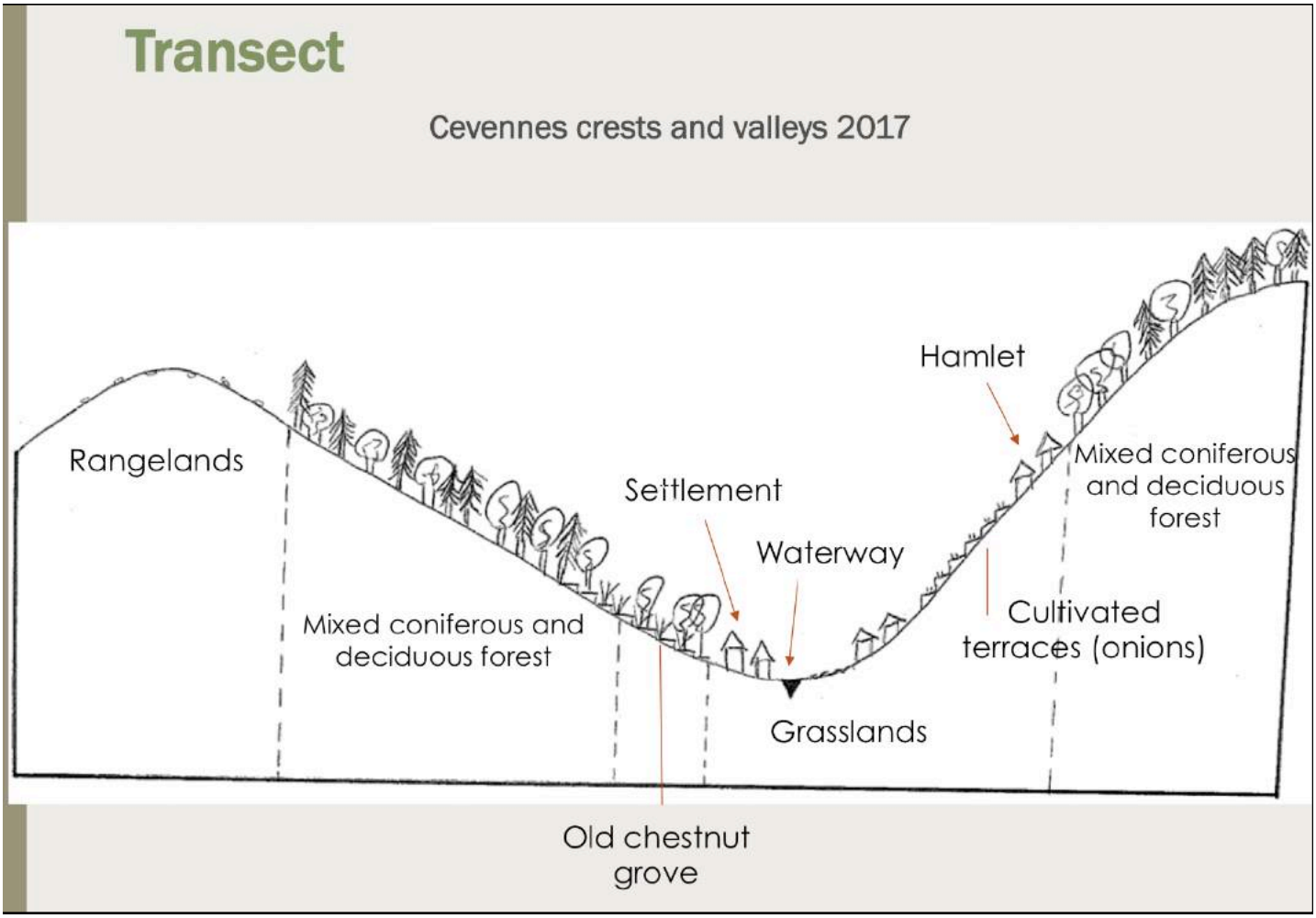
On Mount Aigoual, the rough grazing areas at the top are used as summer land and the hillsides are wooded.

On Mount Lozere, farms use rangeland and rough grazing on the hillsides. There are springs and streams everywhere. In the last few years, farmers have been removing the stones from the rangeland to transform it into sowed grassland. More and more farm sheds are appearing.

Landscape

High Cevennes – Mount Lozere

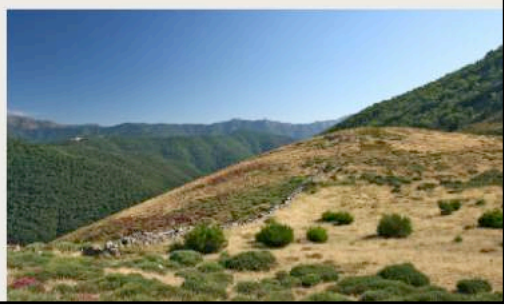




The landscapes of the crests and valleys are covered with mixed forest (conifers, beech trees).
Settlements are villages in the valley bottoms and hamlets on the hillside. Terraces are used to grow mild onions and as pastures. Some grasslands in the valley are also used for pasture and to mow the grass for hay. There are also some relic chestnut groves.
Depending on the valleys, open heathlands or holm oak wood are found on the crest. Conifers were planted on the hillsides and are gaining ground.

Landscape

Cevennes crests and valleys



Threats: abandonment, reduction in grazing and pastoral activities (burning, felling trees), afforestation or intensification with soil tillage, fertilization

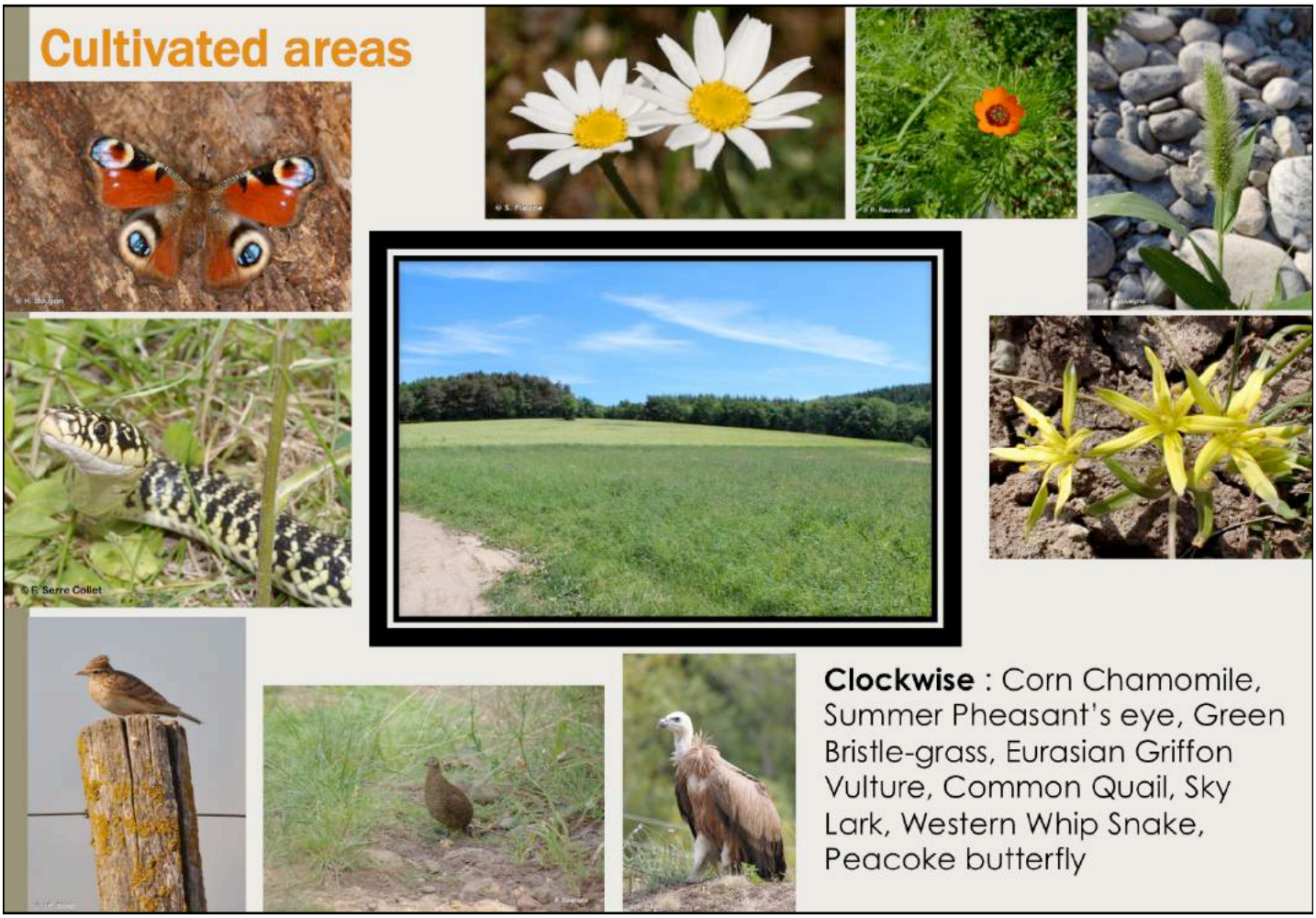
What can be done to preserve or improve biodiversity: late mowing, extensive grazing

Rich biodiversity depends on open areas, calcareous soil

Examples of plant species: *Armeria girardii (*Thrift), *Aster alpinus subsp. Cebennensis* (Alpine Aster), *Stipa pennata* (European Feather grass), *Sesleria caerulea* (Blue Moor-grass), *Phyteuma tenerum* (Spiked Rampion), *Orphys aymominii* (an orchid endemic to the region), and a lot of other orchids.

Examples of animal species: *Timon lepidus* (Ocellated Lizard), *Lacerta bilineata* (Western Green Lizard), *Podarcis liolepis* (Catalonian Wall Lizard), *Circus pygargus* (Montagu's Harrier), *Circus cyaneus* (Hen Harrier), *Burhinus oedicnemus* (Stone-curlew), *Celes variabilis (*Grasshopper) *Coronella girondica* (Southern Smooth Snake), *Anthus campestris* (Tawny Pipit) , *Emberiza hortulana* (Ortolan Bunting) , *Athene noctua* (Little Owl).

(Source pictures and translation: https://inpn.mnhn.fr - www.cevennes-parcnational.fr - flore.aveyron.free.fr)



Threats: Abandonment of tilling, creation of enclosures, weeding, the use of chemical products (that should only be used in moderation).
How to preserve or improve biodiversity: continue using cultural practices and keep open areas, keep walls and terraces.
Rich biodiversity depends on open areas, rich soil with water, plants are opportunist and cannot survive too much competition. Animals depend on open areas to hunt and small habitats around cultivated areas (walls, water).

Examples of plant species: *Anthemis arvensis* (Corn Chamomile), *Adonis aestivalis* (Summer Pheasant's-eye), *Adonis flammea* (Large Pheasant's-eye) , *Chenopodium polyspermum* (Many-seeded Goosefoot), *Urtica urens* (Small Nettle), *Seteria viridis* (Green Bristle-grass), *Agrostemma githago* (Corncockle), *Asperula arvensis* (Blue Woodruff), *Ranunculus arvensis* (Corn Buttercup), *Papaver rhoeas* (Common Poppy), *Gagea villos* (Hairy Star o Bethlehem).

Examples of animal species: *Gyps fulvus (*Eurasian Griffon Vulture), *Aegypius monachus* (Monk Vulture *Neophron percnopterus (*Egyptian Vulture), *Coturnix coturnix (*Common Quail), *Pyrrhocorax pyrrhocorax (*Red-billed Chough), *Alauda arvensis (*Sky Lark), *Hierophis viridiflavus (*Western Whip Snake), *Anguis fragilis (*Slow Worm), *Aglais io (*Peacock)

(Source of pictures and translation: https://inpn.mnhn.fr)

Threats: Enclosure and afforestation, invasion by dominant species
How to preserve or improve biodiversity: fell trees, fell pines, cut back high shrubs, use spin weeder, extensive grazing, burning, avoid artificial afforestation.
Rich biodiversity depends on open areas (no woodlands) but a patchwork of relatively open landscapes

Examples of plant species:
Causses: *Amelanchier ovalis* (Snowy Mespilus), *Buxus sempervirens* (Box), *Echinospartum horridum is a* thorny and cushion-shaped chamaephyte, *Juniperus communis (Common Juniper), Prunus spinosa* (Blackthorn), *Trifolium rubens (Red Clover) Rubus spp, Rosa villosa* (Apple Rose)
High Cevennes: *Genista sagittalis* (Winged Greenweed), *Calluna vulgaris* (Heather), *Vaccinium myrtillus* (Bilberry), *Cytisus oromediterreneus (no common name in English)*
Cevennese crests and valleys: *Cistus laurifolius* (Laurel-leaved Cistus), *cistus pouzolzii* (common name unknown), *Adenocarpus complicatus (no common name in English), Erica scoparia* (Broom), *Erica arborea* (Tree heath), *Quercus ilex* (Holm oak - Evergreen oak), *Genista monspesssulana* (Montpellier Broom), *Pteridium aquilinum* (Bracken), *Citisus scoparius* (Broom), Genista scorpius (Purge broom).

Examples of animal species:
Causses: *Aquila chrysaetos* (Golden Eagle), *Circaetus gallicus* (Short-toed Eagle), *Sylvia undata* (Dartford Warbler), *Lanius collurio* (Red-backed Shrike), *Emberiza cia* (Rock Bunting), *Anthus campestris* (Tawny Pipit), *Saxicola rubicola* (European Stonechat), *Podarcis muralis* (Common Wall Lizard), *Vipera aspis* (Asp Viper)
High Cevennes: *Anthus pratensis* (Meadow Pipit), *Anthus spinoletta* (Water Pipit), *Vipera berus* (Adder), *Zamenis longissimus* (Aesculapian Snake), *Zootoca vivipara* (Viviparous Lizard), *Antaxius sorrezensis (French Mountain Bush Cricket), Metrioptera brachyptera* (Bog Bush Cricket)
Cevennes crests and valleys: *Caprimulgus europaeus* (European Nightjar) , *Sylvia hortensis* (Orphean Warbler), *Sylvia cantillans* (Subalpine Warbler), *Lanius senator* (Woodchat Shrike), *Circaetus gallicus* (Short-toed Eagle), *Malpolon monspessulanus* (Western Montpellier Snake), *Genetta genetta* (Genet), *Podarcis liolepis* (Catalonian Wall Lizard), *Lacerta bilineata* (Western Green Lizard).

(Source pictures and translation: https://inpn.mnhn.fr)

Threats : no real threat except invasion by conifers in some places
How to preserve or improve biodiversity: No human intervention in deciduous forest; limit expansion of conifers. Rich biodiversity depends on old trees (the older the better), local tree species.

Examples of plant species: *Castanea sativa* (Sweet Chestnut), *Quercus ilex* (Holm oak - Evergreen oak), *Quercus pubescens* (Downy oak), *Buxus sempervirens* (Box), *Fagus sylvatica* (Beech), *Quercus petraea* (Sessile oak), *Pinus sylvestris* (Scots Pine), *Acer pseudoplatanus* (Sycamore tree).
Afforestation: *Pinus nigra* subsp. *Salzmannii* (Pyrenean pine), *Cedrus atlantica* (Atlas Cedar), *Picea abies* (Norway Spruce), *Larix decidua* (European Larch), *Pinus pinaster* (Cluster pine - Maritime Pine), *Pinus nigra (Black pine).*
Ilex aquifolium (Holly), *Hedera helix* (Lierre grimpant), *Smilax aspera* (Common Smilax), *Cyclamen balearicum* (Balearic cyclamen *Anthoxanthum odoratum* (Sweet Vernal Grass), *Pteridium aquilinum* (Bracken), *Cytisus scoparius* (Common broom), *Aster alpinus subsp. Cebennensis* (Alpine aster), *Buxbaumia viridis* (Green Shield-moss).

Examples of animal species: *Turdus philomelos* (Song Thrush), *Regulus ignicapilla* (Firecrest), *Accipiter nisus* (Eurasian Sparrowhawk), *Accipiter gentilis* (Northern Goshawk), *Strix aluco* (Tawny Owl), *Certhia brachydactyla* (Short-toed Treecreeper), *Poecile palustris* (Mesange nonette*), *Dendrocopos major* (Great Spotted Woodpecker), *Tetrao urogallus* (Wood Grouse *Aegolius funereus* (Tengmalm's Owl), *Cerambyx cerdo (Great Capricorn beetle), Lucanus cervus* (Stag Beetle), *Thaumetopoea pityocampa* (Pine Caterpillar), *Zamenis longissimus* (Aesculapian Snake)

(Source pictures and translation: https://inpn.mnhn.fr)

The time line
Causses & Cevennes

Explaining the present with the past

Source : The Regional Nature Reserve of Grands Causses

An overall view of the time line

Up to 1950
Slikworm farm
Large domain in Causses, little farms in Cevennes
Rural exodus

1950 – 1970
Mechanization, modernisation, intesification
Creation of CAP

1970 – 1990
Intensification and specialization
Environment awarness

1990 – 2017
Develoment of environmental protection tools

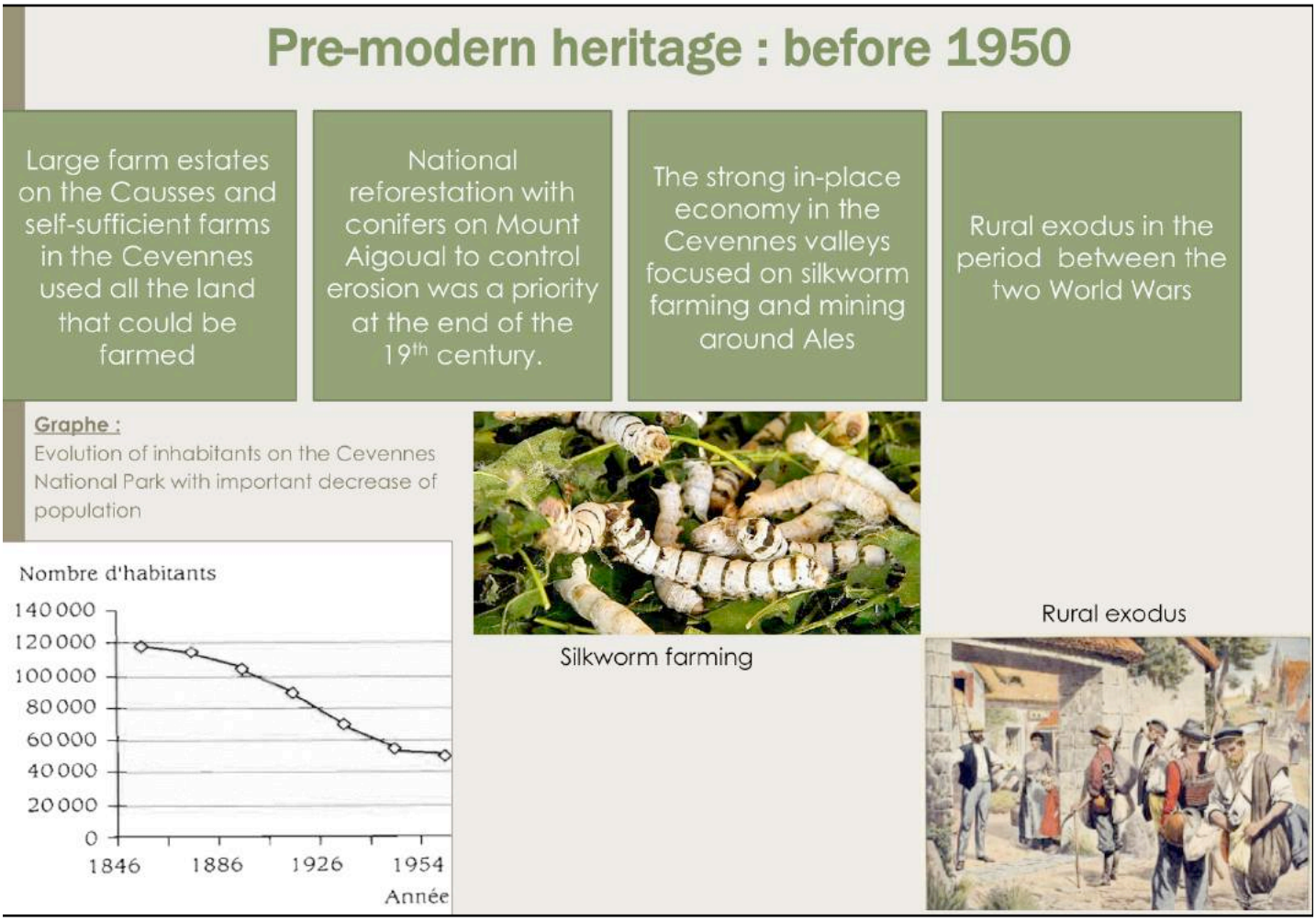
Wilkworm farming

Dairy farm

CAP reform of 2015

Source pictures :
Book : L'aveyron, au temps de la terre 1950 -1960
http://www.lesrendezvousdelareine.com/page/8
http://www.ethiquable.coop/fiche-producteur/association-paysans-rance-commerce-equitable-France
http://www.museedelasoie-cevennes.com/

For millennia (since about 6,000 years BC), sedentary or transhumant agropastoral systems have enabled people to live on this territory and to maintain vast open spaces used to pasture flocks and grow crops, thereby creating specific landscapes and very rich biodiversity.
Humans have left their imprint on the landscape the built heritage, which reflects the population's activity, faiths and traditions.
Human settlement in these difficult regions took place at the expense of the forest, which was the original land cover.
In the Middle Ages, the monastic orders, first the Templars and then the Hospitallers on the Causses, played a very important role in clearing the landscape and introducing livestock breeding.



<u>The main facts concerning the territory Causses and Cevennes territory during the 20th century:</u>

The territory was characterized by peasant agriculture; all possible land was farmed. The rural exodus began between the two World Wars.

<u>Causses and Gorges:</u>

The old system with the big estates managed by farmers or sharecroppers, small farms around the villages, landless peasants who worked in the big domains came to an end. Big estates averaged 400 ha, medium farms 100 ha, and small farms 50 ha.

The basic economy focused on raising Lacaune sheep for cheese production:

- development of the Roquefort cheese industry;
- cereal crops, above all wheat;
- expansion of forage crops;
- increase in the sheep population and a change in the kind of livestock: wool was no longer produced, instead, sheep were raised for cheese and meat (especially lamb) ;

Complementary productions included cattle, horses, vineyards and fruit trees in the valleys, forestry and forest resources on the hillsides.

<u>High Cevennes:</u>

During the 19th century population growth reached a peak leading to pressure on pastureland.

At the end of the 19th century, the State helped reforest highly degraded zones caused by overgrazing above all on Mount Aigoual.

<u>Cevennes crests and valleys:</u>

Chestnut groves on the terraces plus sheep and goat breeding.

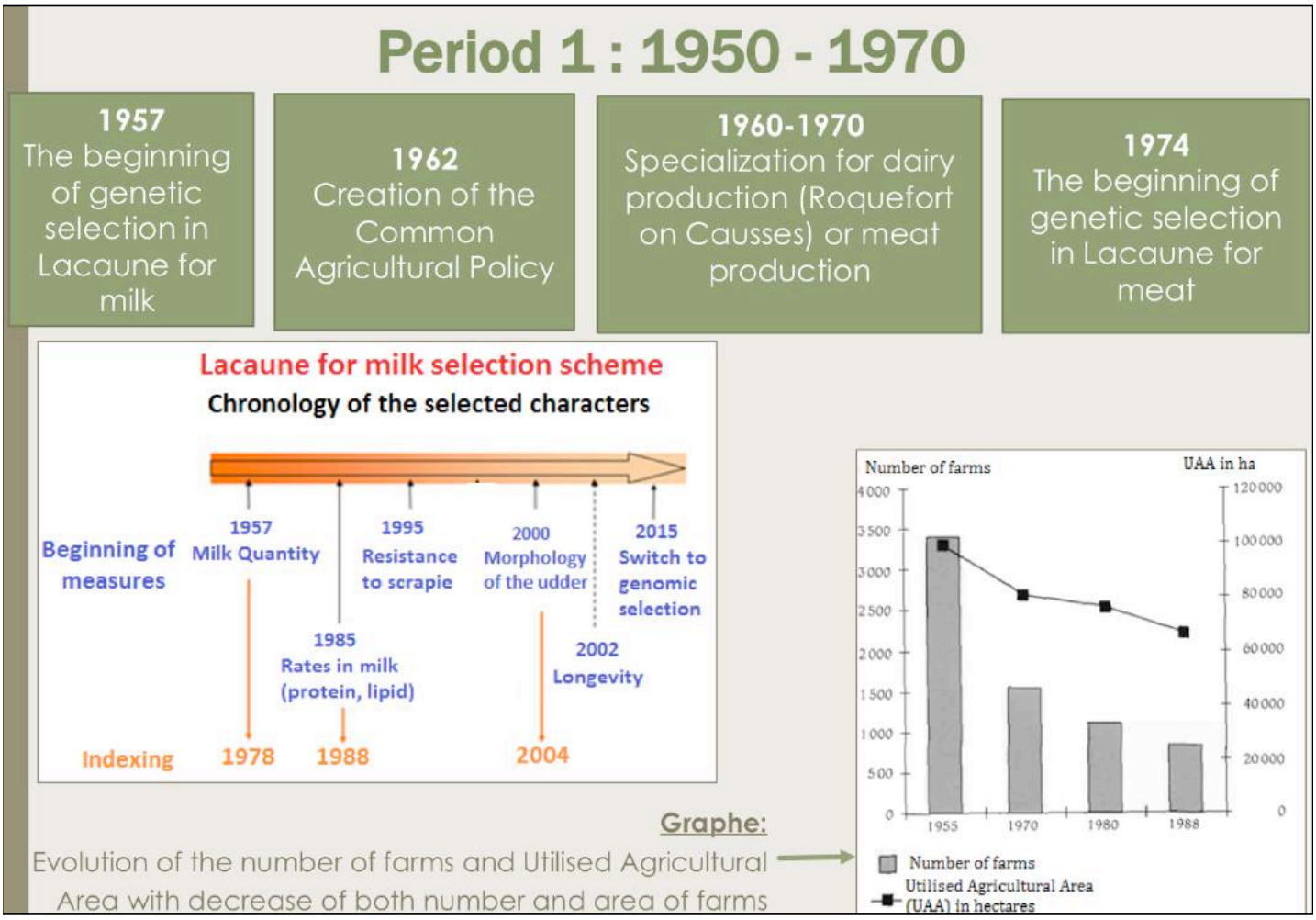
Strong in-place economy focused on silkworm farming and the cultivation of mulberry trees as food for the silkworms. The built heritage was modified to accomate the silkworms.

At the same time, coal mining around Ales played a major role in economic development. Railroads were built to export the coal.

Between 1950 and 1960, silkworm farming and mining around Ales stopped increasing the rural exodus of the Cevennes population.

Period 1

Changes from the XXth Century



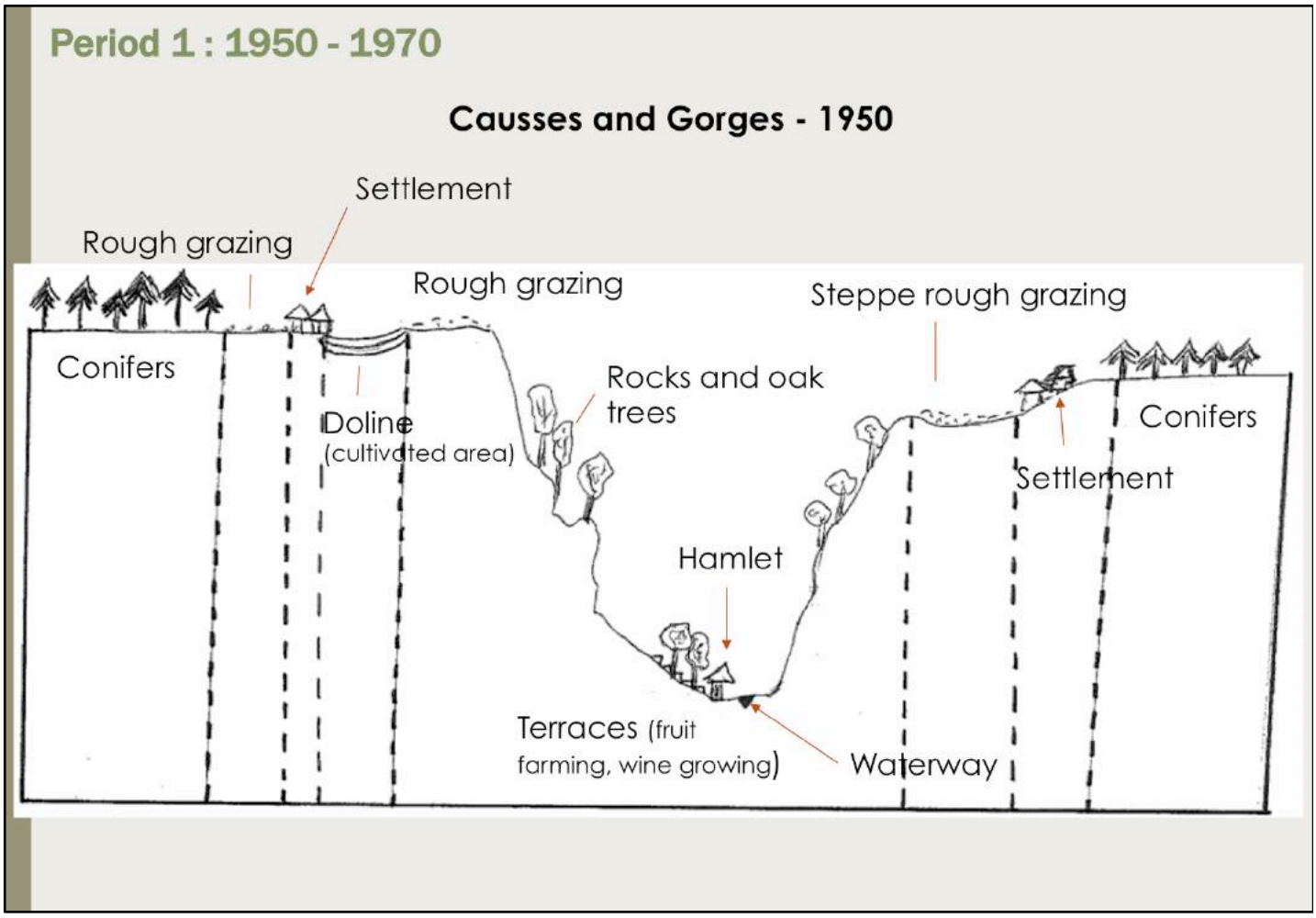
In the second half of the 20th century:

From 1950 to 1970: this was a period of reconstruction after the war, which led to many changes to traditional agropastoralism and transformed the landscape of the Causses and Cevennes, in particular through:

- Wire fencing after World War 1, which meant animals could be enclosed and shepherds were no longer required;
- Mechanization and farm modernization (extension and modernization of the farm buildings, the use of tractors) facilitated fieldwork ;
- Intensification of agriculture and increase in production thanks to the creation of the Common Agricultural Policy (CAP) in 1962:
    - Fertilization: mineral fertilizer and lime were used.
    - Development of forage cropping and seed production.
    - Beginning of the use of genetic selection.
    - Between 1960 and 1970, the farmers specialized in dairy production (Roquefort cheese) and meat production for the meat industry

Changes in agricultural practices and the structuring of farms appeared with the creation of the agricultural cooperatives and the farmers' union (Young Catholic Farmers' Union), the development of banks and the arrival of agricultural advisory services.

The other highlights were the development of the railroad network and the creation of open markets, the impact of industrialization on the economic sector.



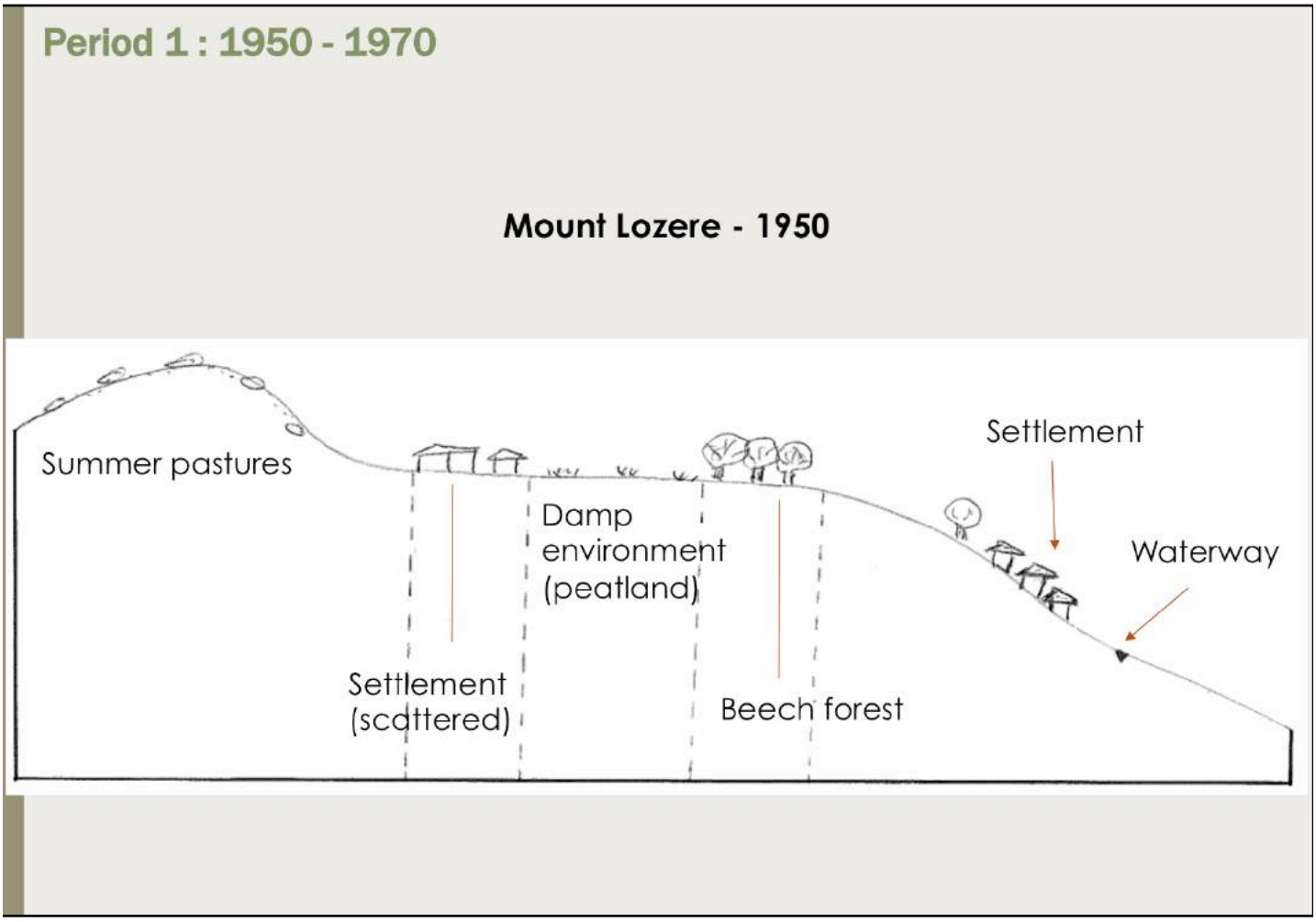
Causses

From 1950 to 1990: reconstruction after war.

This period witnessed the end of the big estates whose land was reforested with conifers, particularly with the Black Pine of Austria, including on arable land, with the French National Forest Fund; the big estates are purchased by investors not farmers, and the rest were rented out to farmers.

Between 1960 and 1965, a new agricultural system appeared: with animal nutrition, mechanization, forage crops and seed production, land planning with the French structure which manage agricultural land *(French acronym SAFER),* the development of agricultural cooperation, increased agricultural intensification, farming systems that were well suited to the Causses. There was also an increase of the number of ewes of different breeds: Lacaune for milk, Blanche du Massif Central for meat.

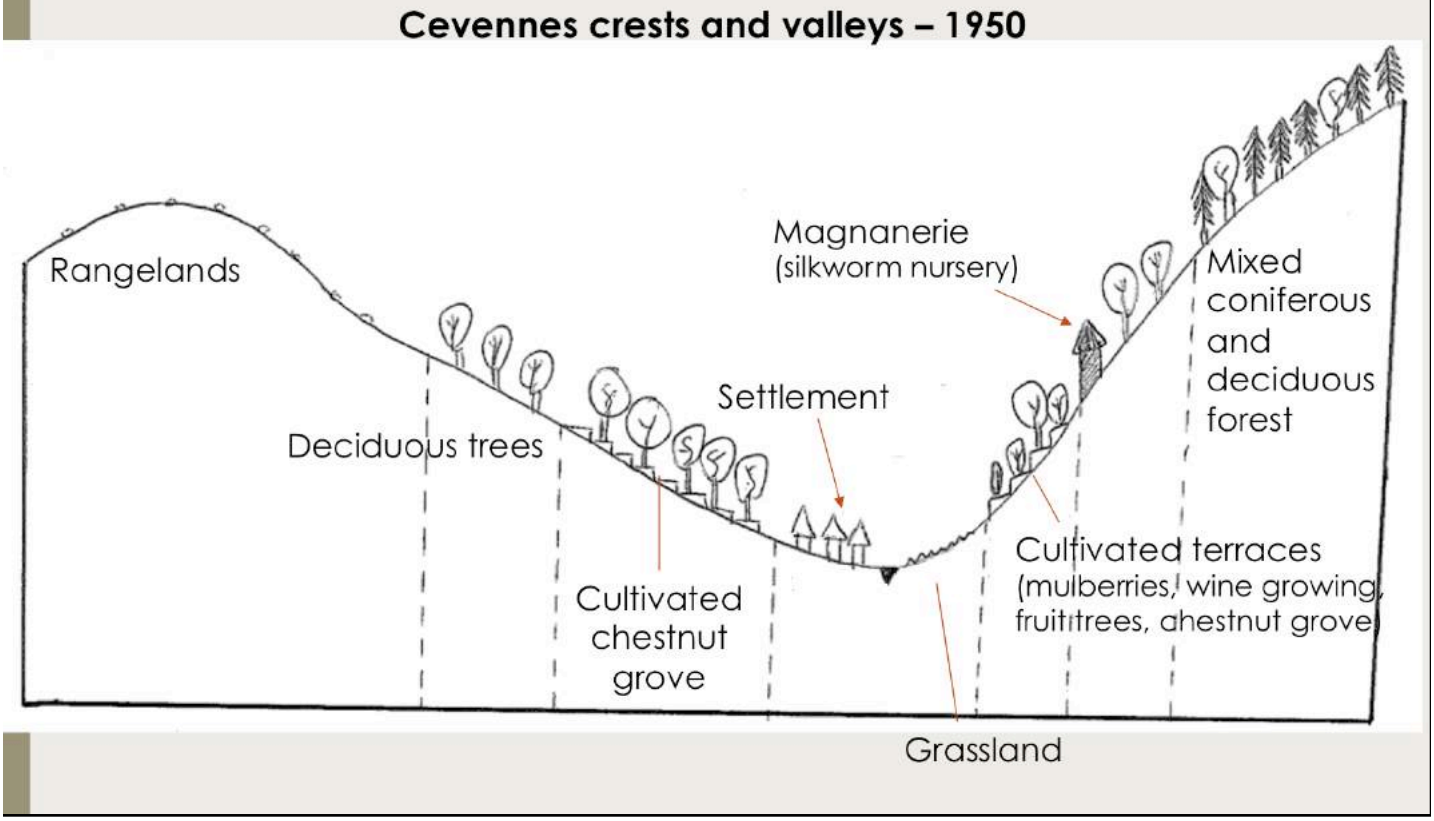
The farmers' union (Young Catholic Farmers' Union) played a major role within the framework of the Causses Restructuring Plan, with the support of Edgard PISANI, Minister for Agriculture from 1961 to 1966, with the construction of the necessary infrastructure (roads, water, power lines). These public works, particularly on the Causse Mejean, were carried out between 1961 and 1975 with subsidies from the Ministry.



High Cevennes

Because of the rural exodus, the open areas of Mount Lozere became degraded due to less pastoral pressure.

Period 1 : 1950 - 1970



Cevennes crests and valleys

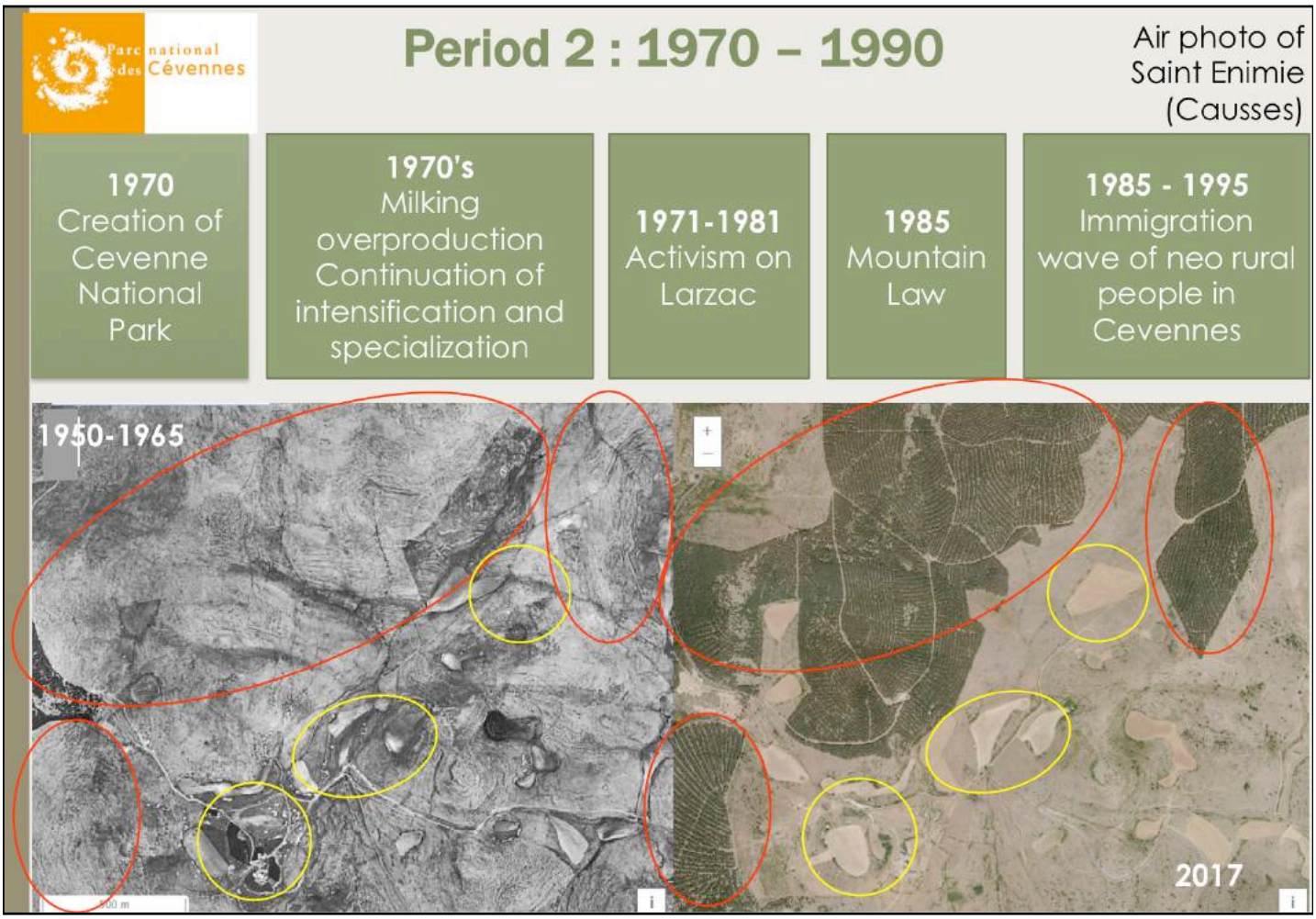
From 1960-1970, the open markets and price reductions led to an increase in size of the sheep herds, with increased investment in production equipment and farm specialization.

Following the rural exodus, from 1970 on, there was a wave of immigration when « neo-rural people » started small goat farms. This enabled the expansion of this type of livestock breeding and the creation of agricultural cooperatives.

1980-1985 saw the beginning of mild onion production (with a label), the production and processing of sweet chestnuts and also local crafts (art, jewelry making), truck farming, fruit tree orchards and agro-tourism. The « neo-rural people » contributed significantly to this development.

Period 2

Further changes from the XXth Century



<u>Causses:</u>

As early as 1970, the increase in production led to overproduction, especially in the dairy sector. As the increase in production took place without increasing the amount of grazed pasture, some areas were colonized by trees.

This period was characterized by:

- Continued intensification and specialization (use of fertilizers and chemical plant protection products, the use of veterinary medication) ;
- Modernization of equipment and mechanization, investments in farms enabled by European subsidies;
- Expansion of irrigation with the creation of ASA (owners' trade union) and drainage of damp zones;
- Revolution in forage species: new types of forage plants (*Dactylis glomerata, Festuca, Lolium perenne*) developed by the French Agricultural Research Institute (French acronym INRA);
- Development of the food industry and agricultural structures;
- Access to overseas markets.

<u>High Cevennes:</u>

In 1970, transhumance of sheep began again.

<u>Cevennes crests and valleys:</u>

The production of goats cheese (Pelardon) expanded with the expansion of agricultural cooperatives.

The Cevennes National Park was created in 1970, enabling agro-environmental progress (open spaces, expansion of summer pastures).

Sheep and goats were fed with forage and concentrates produced outside the area.

The stock of sheep stagnated and the stock of goats declined, which resulted in less pastureland being used and hence the invasion by scrub-like vegetation of the underbrush and old terraces previously kept clear by goats and also on Mount Aigoual, where the rough grazing had been kept clear by transhumaned sheep.

From 1980, the cultivation of mild onions intensified.

Period 3

Present times

<u>From 1990 to 2017</u>

In the 1990s, environmental approaches and tools were introduced :

In 1987, after the huge wildfires in 1986, the Mediterranean Forest Conservatory was created.

In 1991, the first environmental contracts with farmers were drawn up, in application of European rules (article 19). These contracts were reinforced by the CAP reform in 1992 (PHAE, MAE, PDZR* with European funds).

In 1992, the Brundtland report by the World Commission on Environment and Development (United Nations) was published along with a founding text called « Our Common Future - From One Earth to One World » which, among other things, defined the concept of sustainable development (with 27 sustainable development principles). The report was adopted during the Rio de Janeiro Earth Summit.

Reform of the CAP with strengthening of agro-environmental measures (PHAE and MAE*).

Beginning of Natura 2000 with the application of two government directives : « Fauna and Flora Habitat Directive) » (May 21, 1992) and the « Birds Directive ».

At the same time, several agricultural practices were changing thanks to awareness of the risks of enclosing the environment (risk of wildfire, problem of biodiversity); pastoral arrangements with funds from the Mediterranean Forest Conservatory and support for livestock breeding farms in risk zones; beginning of the appearance of local products, farmers shops, local product markets (1980-1990).

There was also the arrival of wolves in Lozere in 2011.

**PHAE = Subsidies for grasslands, 2nd pillar*

MAE = Agro-environmental measures

PDZR = Rural development, 2nd pillar

<u>Causses and Gorges</u>

<u>1990-2017:</u> increase in the use of rangeland by farmers.

The Brundtland report and environmental regulations laid down in CAP made farming less intensive. But since the return of wolves in Causse Mejean, breeders have tended to intensify their systems again.

<u>Cevennes crests and valleys</u>

In the 1990s, subsidies for agro-environmental measures encouraged breeders to increase their rangelands (subsidies for grassland, Agro-environmental measures) but the increase in the size of the herd did not compensate for the reduction in the number of farms, partly due to the drop in breeders' income. (source: Mazoyer et Roudart, 1997).

The chestnut gall wasp (*Dryocosmus kuriphilus)* began to attack chestnut trees and caused a drop in production in both sweet chestnuts and chestnuts used as feed for animals.

The proportion of wooded cover in the core zone of the Cevennes National park was 15% in 1850,
72% in 1980 and 74% in 1990.

Scenarii 2030
Causses & Cevennes

Source : The Regional Nature reserve of Grands Causses

The business as usual scenario

In 2030 we will observe an important phenomenon of both abandonment and intensification of lands

With LA was put on UNESCO's World Heritage List, the area became a very popular tourist destination and developed into an important economic sector. The number of hotels, guest houses, farm camping sites, restaurants, etc., increased while the local road network remained underdeveloped because of the mountain landscapes.

Hiking is very popular with tourists, especially along Stevenson's trail from Le Puy-en-Velay to Ales (274 km) and the 4000 step trail from Valleraugue to the summit of Mount Aigoual (9.5 km – 1,220 m of difference in altitude).

Some local products are sold in street markets where producers and sellers set up tables with their products (food or other products). This is the main way the local goat and ewe cheeses produced in our LA are sold. Cooked pork meats, wines, vegetables, fruits, clothes, craft products, etc. are also sold. Weekly markets are held throughout the year (for example every Tuesday morning in one town) along with seasonal markets (for example one Sunday in July). These markets are very popular and are highly appreciated by tourists.

Some products, primarily meat and cheeses, are sold directly by the farmer to the consumer with no intermediary in 'Farm Gate Sales'.

Other products (milk, live lambs and live calves) are collected from the farms by dealers. Some of the products remain in the LA, goats milk is processed into cheese within the area, but lambs are fattened at the boundary of the LA.

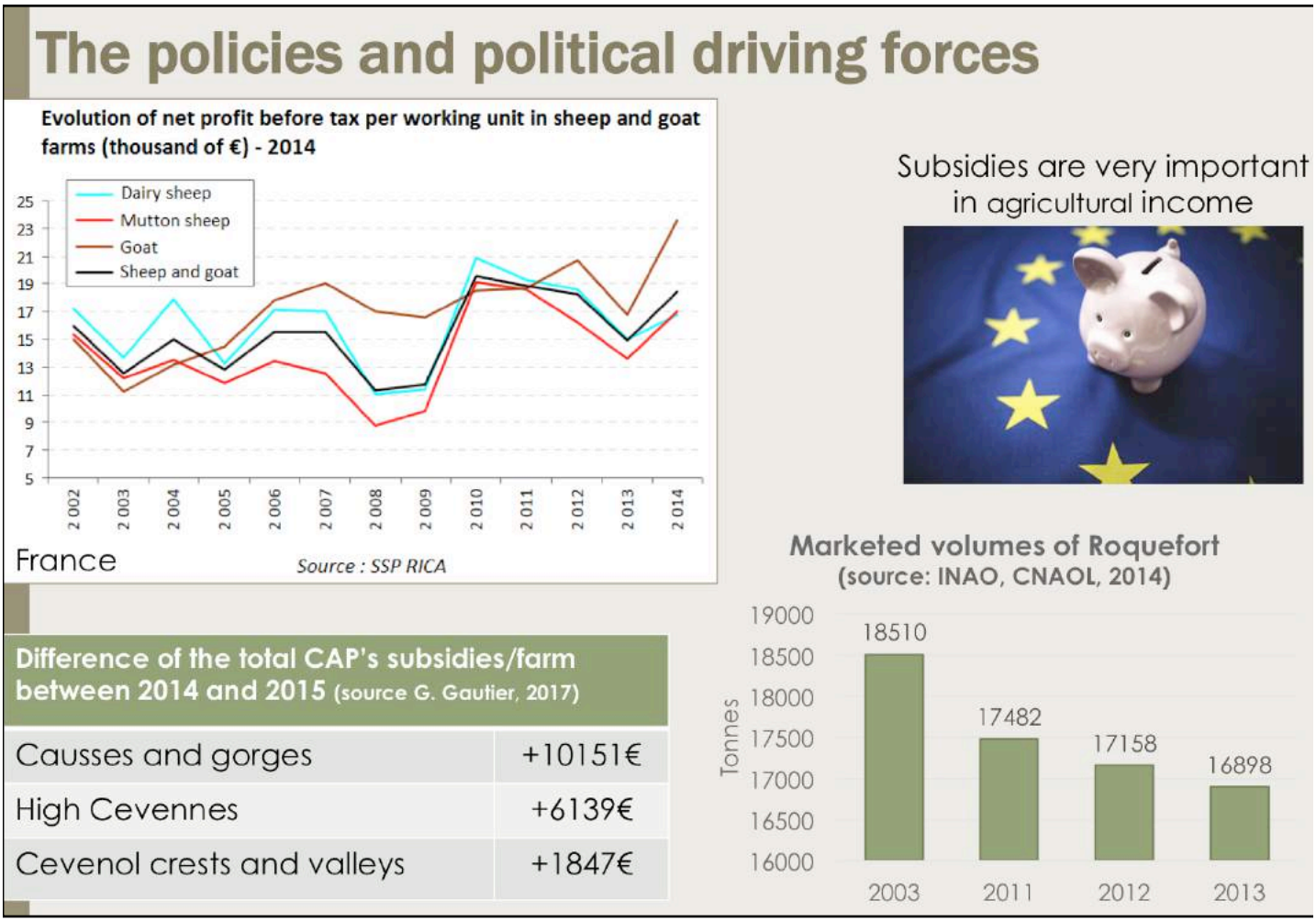
Local sales of animal products depend on the existence of appropriate local facilities such as slaughterhouses, or a cheese factory, even though a large proportion is made on the farm in the Cevennes summits and valleys) or on a milk collection network.

PDO = Protected designation of origin (in French = Apellation d'origne protégée - AOP)

PGI = Protected Geographical Indication (in French = Indication d'Origine Protégée – IGP)

Source of pictures

https://www.fromages-aop.com/fromage/roquefort/
http://pelardon-aop.fr/
https://flashmatin.fr/gastronomie/aoc-aop-igp-label-rouge
http://www.lozere-tourisme.com/agenda



French and European regulations, public policies

French breeders are very dependent on CAP subsidies (> 50% of their income comes from aids) and this dependence could increase with compensation for damage caused by wolves. Subsidies only linked to surface area tend to increase the size of farms, but this phenomenon is limited by the ceiling on aids per worker. Some subsidies are specially used in (and for) natural areas within the territory, like agri-environmental measures. Several subsidies that target mountain ahead (Compensation for Natural handicap, French acronym ICHN) or aids for grassland have made it possible to limit rural exodus of farmers, thereby ensuring agriculture remains a major sector within the territory. Taking woodlands into account in the CAP avoided these areas being abandoned and helped farmers financially. The reform of CAP in 2015 was globally in favor of livestock systems.

Consequences of changes in pastoralism

During the period 1988-2010, intensification focused on the closest and best land: -17% of land under permanent grass but 36% additional productive grassland, 48% additional forage, an increase in the proportion of dairy sheep farms, an increase of the size of sheep herd (from 223 to 311); and abandonment of other lands (rangelands, woodlands), versus a decrease in the number of farms (-38%), decrease of Utilized Agricultural Area (-7%), 22% decrease in the number of goats and 77% decrease in the number of goat farms.

Financial means

The Cevennes National Park has improved the living conditions of shepherd by equipping summer pastures with shepherd's cabins, fences, night enclosures, even if wolves are complicating the organization of the summer pastures.

Quality approach and obligations

There are several quality labels whose specifications require extensive grazing of livestock, some of which also demand a certain level of food autonomy. These labels can limit the abandonment of rangelands but farmers who do not apply for the labels are free to do what they like.

The landscaped development

Causses and Gorges

- Conifers are gaining ground over heathlands
- Pastoral and agricultural activities are only concentrated around farms
- Clapas and stone walls (built heritage) are hidden by vegetation

Invasion by scrubs on Causse of Sauveterre

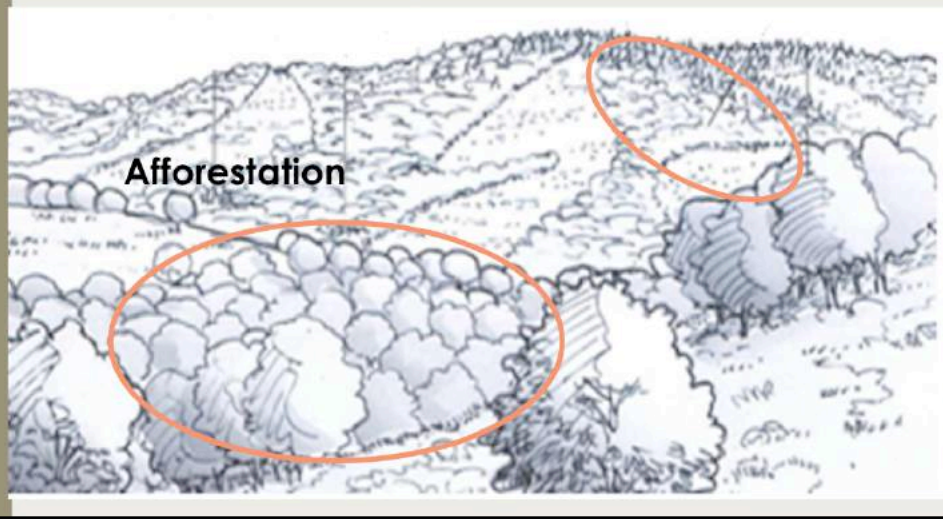
The photograph shows the landscape as it is in 2017; the drawing represents a possibility of landscape under a 'business-as-usual' scenario.

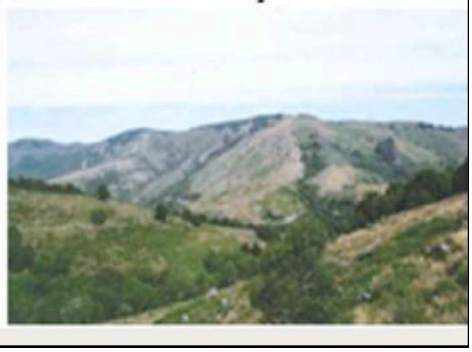
The landscaped development

High Cevennes – Mount Aigoual

- At the time of writing (2017) sheep and controlled burning keep the environment open.
- Cows are replacing sheep, broom and trees are closing up heathlands.
- Conifers and beeches are colonizing parts of the landscape
- Only some cleared areas persists

Aforestation on Aigoual





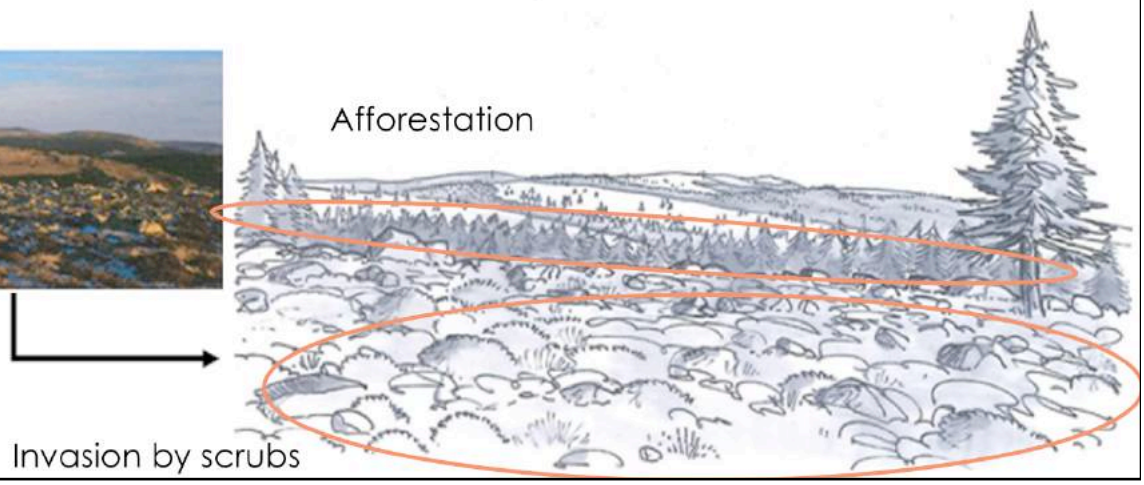
The photograph shows the landscape as it is in 2017; the drawing represents a possibility of landscape under a 'business-as-usual' scenario.

The landscape in the valley of Dourbie with extensive heathlands on the hillsides. This open landscape is maintained by grazing flocks of sheep and regular burning. When cows replace sheep and when there is a decrease in pastureland, broom and woodlands rapidly invade the landscape.
In 2050, assuming that pastoral activity decreases along with burning, conifers and broad leaved trees will cover most of the heathland. Only clearings will remain, so the circulation of herds and flocks will be increasingly difficult and consequently will continue to shrink.

The landscaped development

High Cevennes – Mount Lozere

- At the time of writing, heathlands and short rough grazing areas with some rocks remain.
- Important growth of conifer afforestation due to the rural exodus, there was a significant increase in land covered with conifers, reforestation and a decline in pastoralism.
- Open areas at the summits are becoming progressively fragmented by strips pf woodland.
- Peat soils are endangered by the invasion of shrubs and drainage to create enclosures for herds of cows.

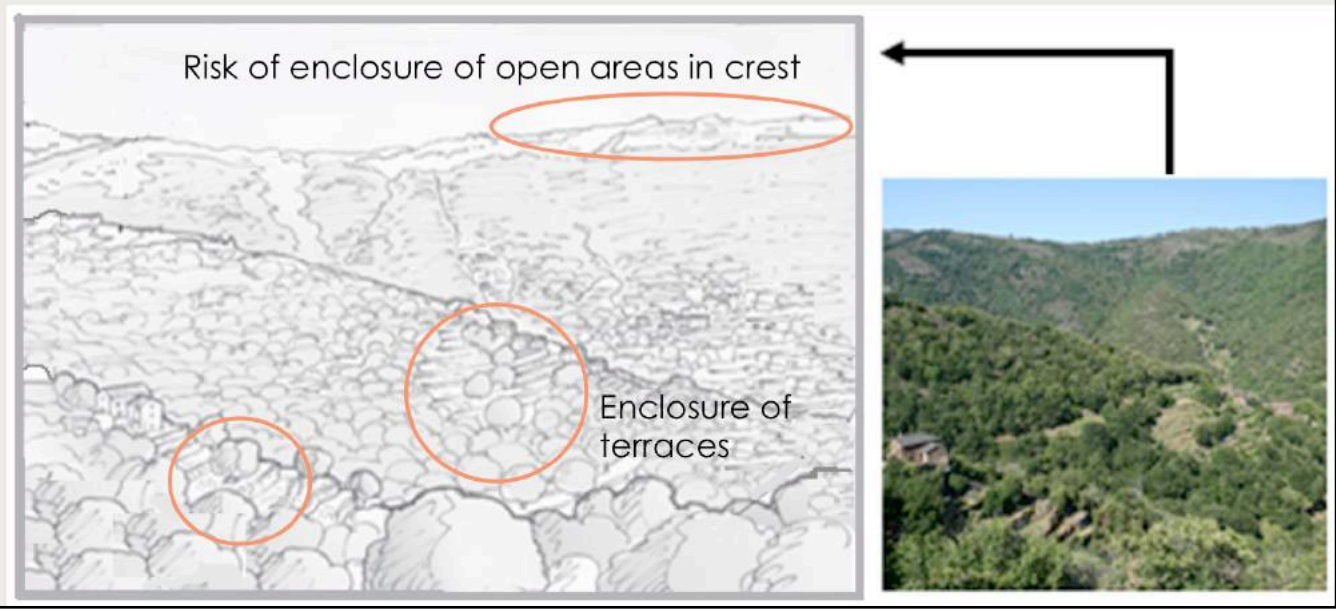


The photograph shows the landscape as it is in 2017; the drawing represents a possibility of landscape under a 'business-as-usual' scenario.

The landscaped development

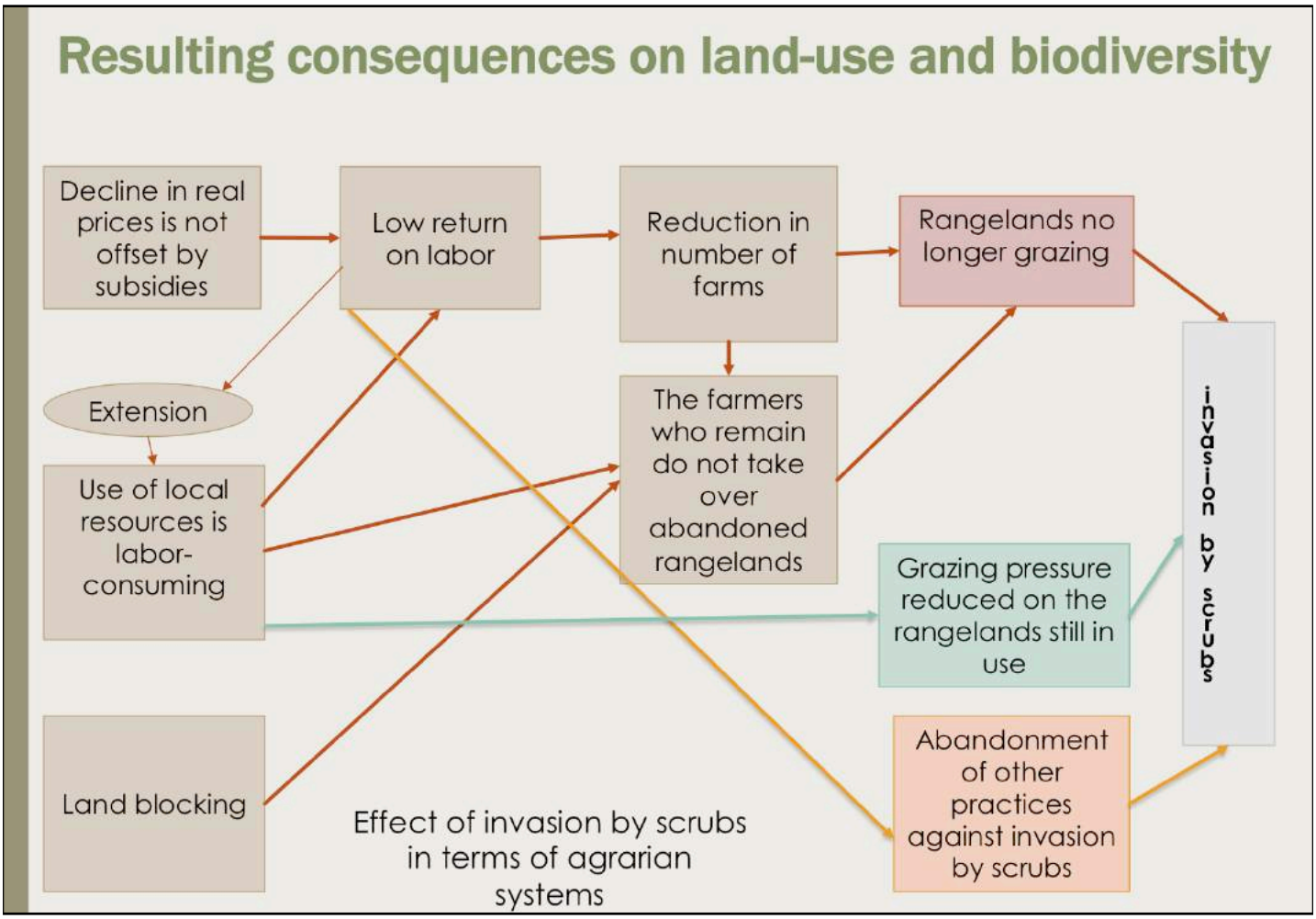
Cevennes crests and valleys

- Holm oak has colonized former chestnut tree forests on dry hillsides
- Heathlands and rough grazing have been invaded by shrubs and woods have progressively gained ground.
- Built heritage is being abandoned



The photograph shows the landscape as it is in 2017; the drawing represents a possibility of landscape under a 'business-as-usual' scenario.

The landscape in Trabassac valley has been very wooded with a dense cover of wild chestnut since its management has been abandoned. The terraces closest to the hamlets continue to be cultivated and heathland used for pasture links the crests and the settlements in the valleys.

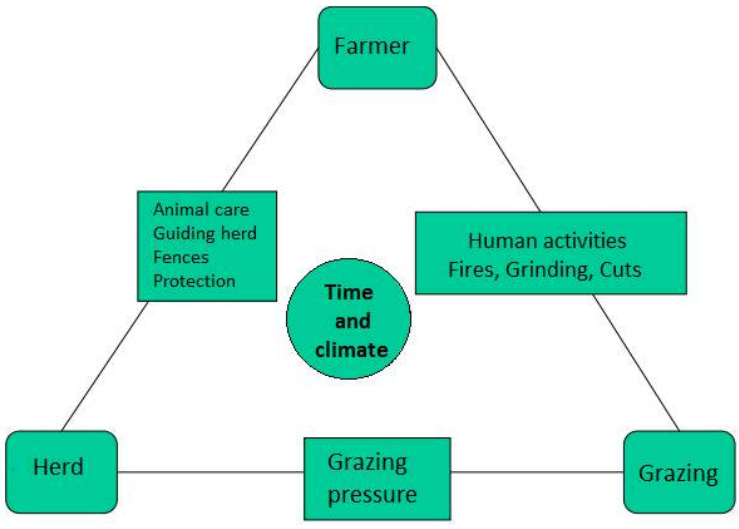


Grazing on rangeland is very time consuming (the shepherd has to remain with the herd and guide it to pasture) so the farmers who have remained do not want to take on any more rangelands. The result is that some rangelands are abandoned and shrubs invade the area due to the reduced grazing pressure.
Due to land blocking (it is difficult to obtain land for pasture), so newly arrived farmers or farmers who remained cannot buy or rent these lands, which is consequently no longer pasture.
The drop in real prices which are not offset by subsidies result in low pay for labor and consequently a reduction in the number of farmers. In the absence of sufficient labor, rangelands are no longer used as pasture.

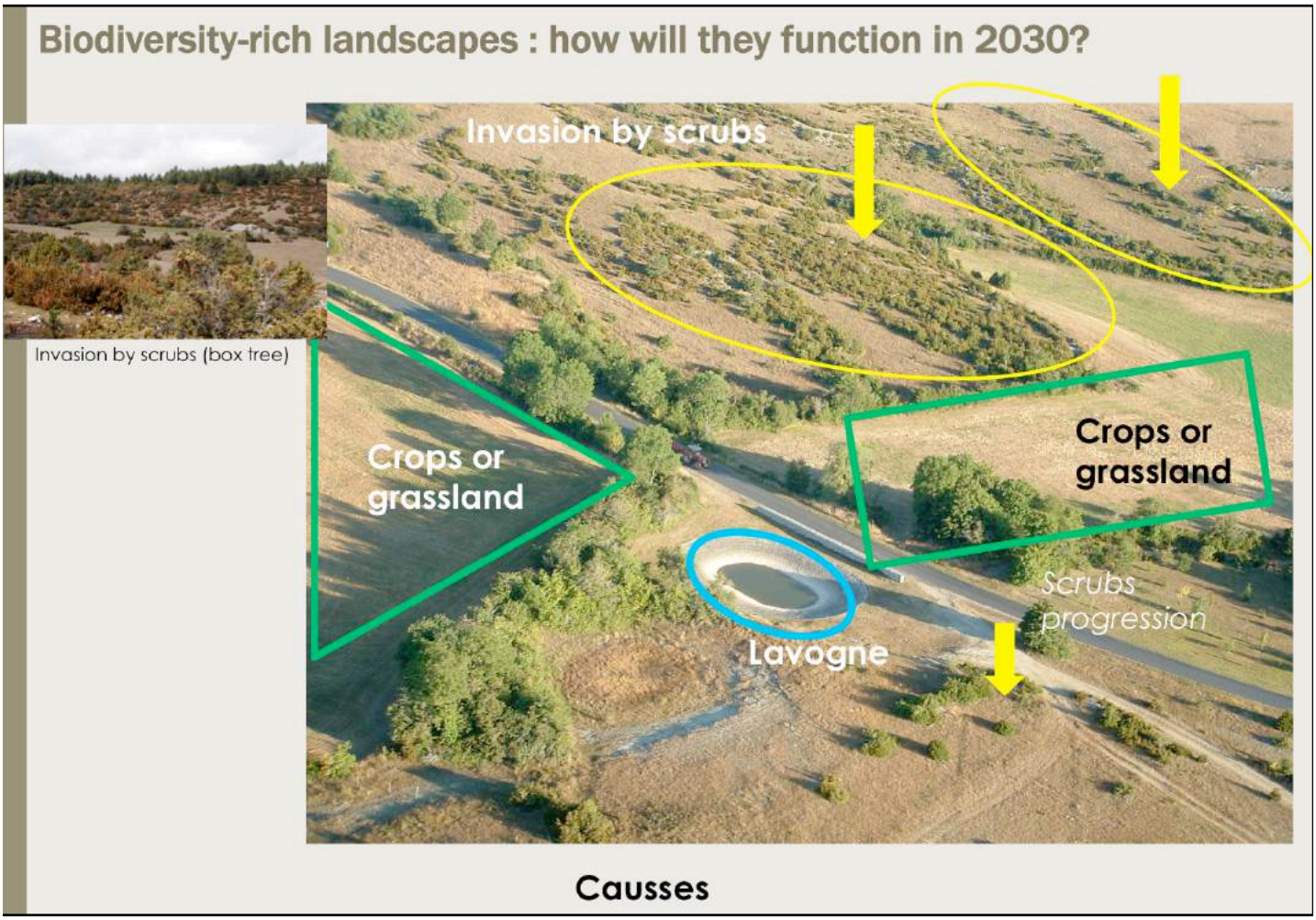
The HNV vision

Managing biodiversity landscapes for a vivid society

Pastoralism is based on a triptych Farmer-Herd-Grazing which could be schematize as:

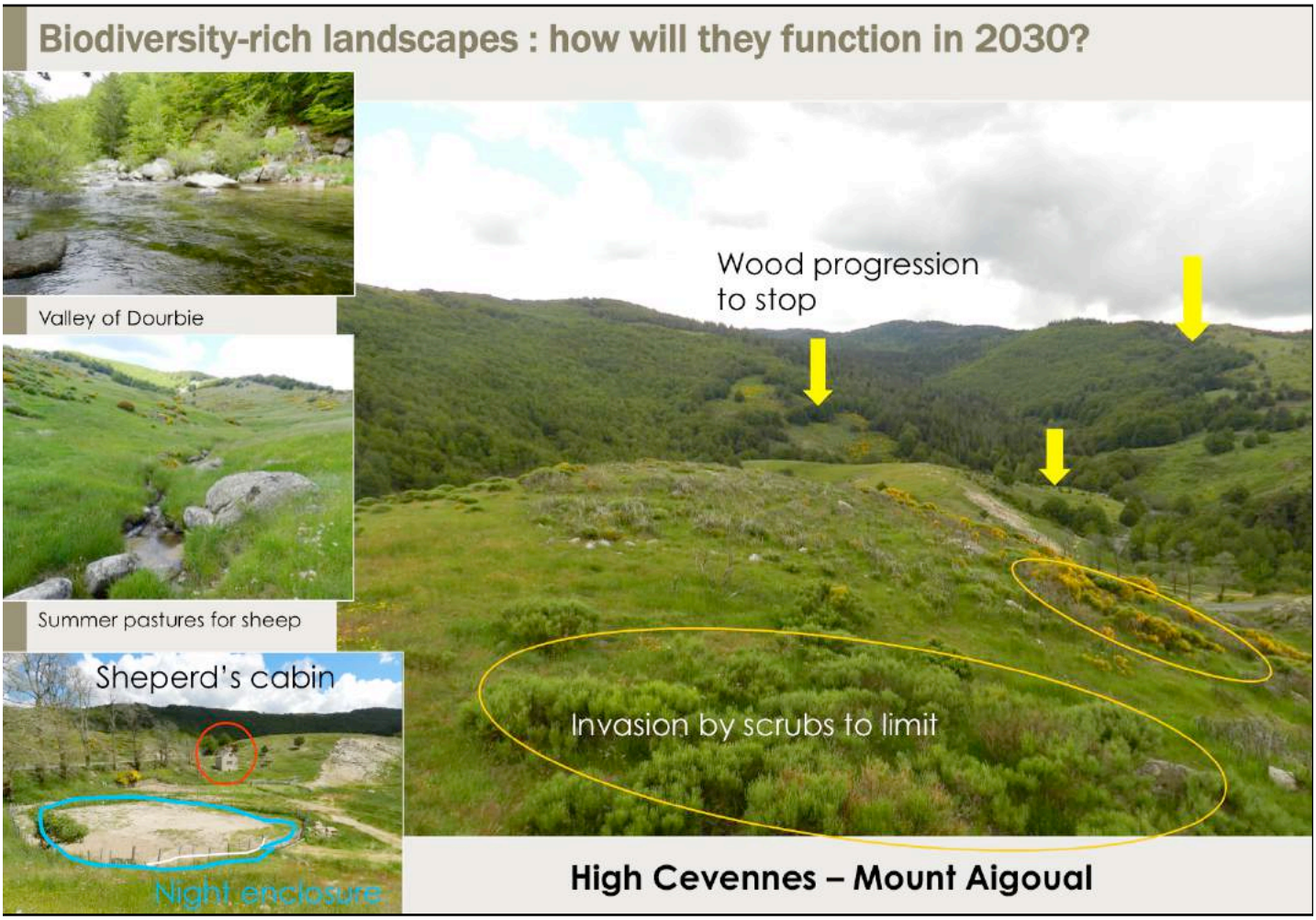


In the center, « time and climate » are really important and showed the place of climatic changes (so grazing changes too) and evolution of the herd (new ewes arrive, old ewe leave).

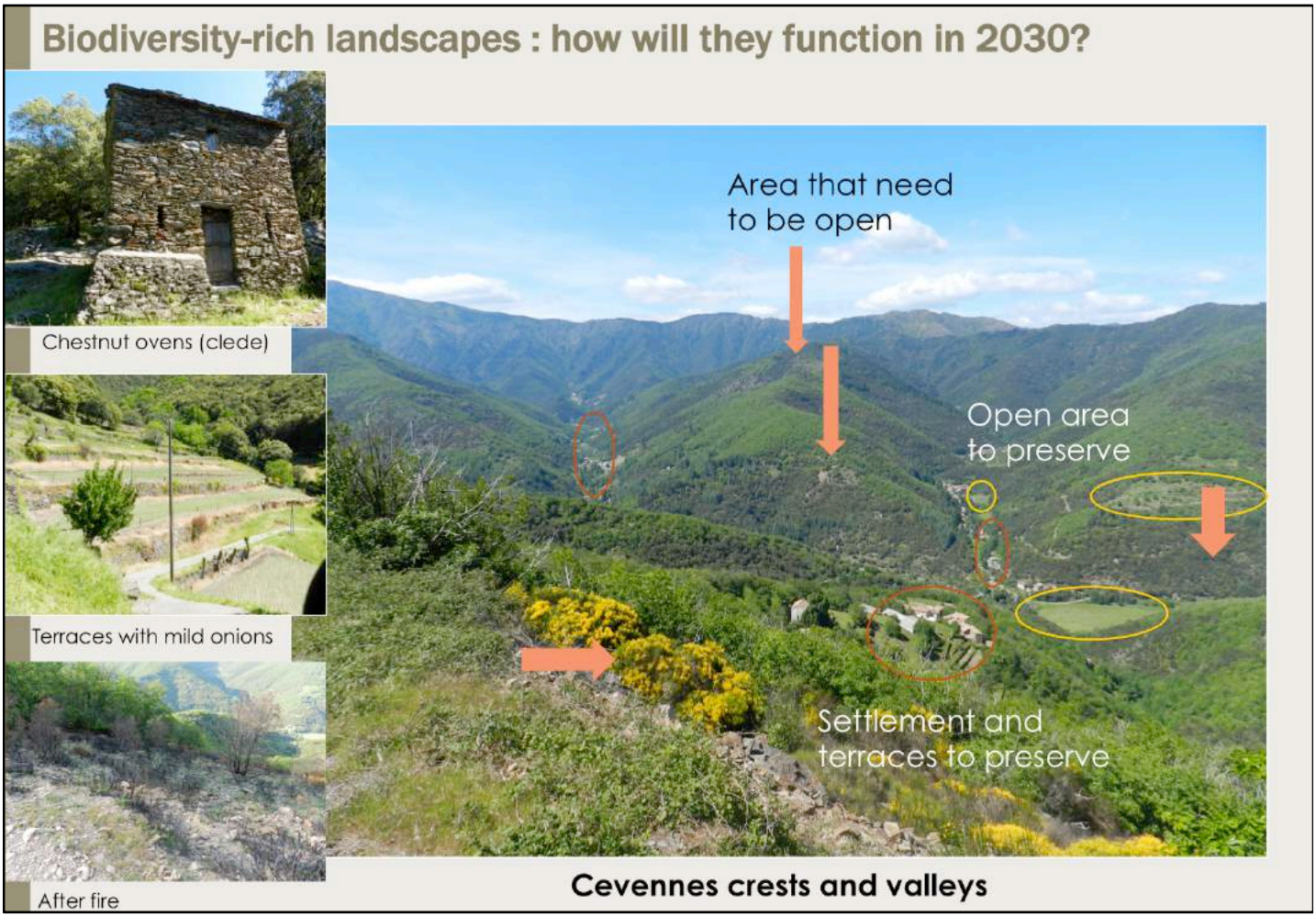


Intensification and abandonment are the two main phenomena in this sub-unit. In the Causses, agricultural intensification is limited to the vicinity of the settlements and includes plowing, the use of chemical products, big agricultural machinery, and an increase in herd size. The major risk is the abandonment of areas that are not productive.

Woodlands will gain ground and as a result, damage caused by big game will increase. The changes in the landscape caused by agricultural activities will disturb the bird populations.



As it is crucial to preserve transhumance, the actions undertaken by the Cevennes National Park and pastoral groups need to continue. If landscapes become more and more homogeneous, biodiversity will decrease.
Agricultural intensification and drainage threaten damp environments. Changes are also taking place in ancestral methods, such as burning (previously only used in winter now also used in spring). There are also changes in pastoral practices (more fences and fewer shepherds) that favor the abandonment of less productive areas.



Landscapes are maintained thanks to grazing and human activities including felling trees, cutting scrubland (re-opening areas), and burning. it is important to maintain the built heritage including walls, houses, chestnut ovens (*clede*). From the HNV perspective, the landscape must be keep open and actions will have to be implemented to keep open areas, as shown by the arrows.

In fact, clearing woods is complicated because administrative authorization is required and obtaining it is not simple. It would be helpful to facilitate clearing and sylvopastoralism (combined use of logging and pasturing livestock in the woods). The exception made in CAP for oak and chestnut forest should also continue to encourage farmers using rangelands and woodlands and should be simplified in the future.

Another aspect that needs to be tackled in the future CAP is the need to focus help on small farms rather than on big ones. This will make it easier to keep herds and flocks small, which are easier to control on rangelands and in woodlands.

Farmers are the main actors who will manage these actions in the LA, but loggers need to be involved as do public bodies (municipalities, the Departments, and the state). It will be interesting to analyze the multifunctionality of livestock production but also the preservation of the landscapes for all the users of the territory.

SWOT analysis of the 3 territorial sub-units (1/2)		
Sub-units	**Strengths and opportunities**	**Weaknesses and threats**
Causses and Gorges	- Development of cattle and horse farming - Extensive production - Many sheep breeders (therefore leverage in negotiations)	- Intensification and extension of farmland - Conversion of rangelands into sowed grassland - Reduced use of rangeland - Threat represented by wolves - Threat of enclosure of the environment and the progression of woodlands - Is there a future for the dairy industry? - Issue of maintaining subsidies (agri-environmental measures)
High Cevennes	- Maintenance of transhumant herds thanks to a pastoral group (collective association for summer pastures) and the Cevennes National Park (French acronym PNC) - Arrangements for shepherds and herds (PNC)	- Increase in cattle farms without transhumance - Agricultural Intensification - Issue of maintaining subsidies (agri-environmental measures) - Threat represented by wolves - Threat of enclosed environment and progression of woodlands - Issue of maintaining transhumance trails - Issue of pastoral practices (burning, fences,...) - Issue of damp environments - Issue of biodiversity and pastoral activities (wolves, Tetrao urogallus)

The Agro-Environmental and Climate Measures (MAEC) are designed to support farms committed to developing practices that combine economic and environmental performance or maintaining such practices when these are threatened with extinction. This is a key tool for the implementation of the agro-ecological project for France. These measures are be used to respond to the environmental challenges encountered in territories including the preservation of water quality, biodiversity, and soils, or the fight against climate change.
Finally, the last but not the least common threat is the risk of landscape enclosure and the progression of woodland. This threat is real and probably the biggest threat to our territory because it is already underway.

<u>Causses and Gorges:</u>
Large farms are using less and less rangeland: they have replaced shepherds by fences, they prefer giving hay and concentrates to their herd than pasturing them because pastoral feeding is very time consuming.
There are important questions concerning the future of the dairy industry with the evolution of the Roquefort sector, industry representatives and farmers will discuss milk prices among themselves (until now these were negotiated by a common structure and dairy quotas applied). The result could be that if future prices are lower, some farmers may quit Roquefort production and become intensive dairy farms without grazing (compulsory under the Roquefort specifications).

<u>High Cevennes:</u>
Transhumant herds continue to graze this area thanks to the creation of collective association of breeders who manage the shepherds, the summer pastures and the mixing of herds and thanks to the Cevennes National Park, which owns a large part of the summer pastureland and makes the necessary arrangements for the shepherds (cabins) and for the herds (fencing, night enclosures).
BUT weaknesses and threats nevertheless exist:
Already, there are sedentary cattle farms with a lot of fences. Sheep are better users of rangeland than cows. Cows damage the environment more than sheep because they are bigger and trample the ground more than sheep.
There is also a trend towards the intensification of land (rangelands become grasslands, fertilizer is used, stones are removed) and the impact of pastoral practices on biodiversity is sometimes questioned (burning, skidding, the use of fences), but these practices also make it possible to keep the environment open.
There is also a problem with maintenance of transhumance trails used by the flocks and herds because ownership is not clear.
Finally there is an issue concerning damp environments with the farmers questioning the Water Law and invasion by

SWOT analysis of the 3 territorial sub-units (2/2)		
Sub-units	**Strengths and opportunities**	**Weaknesses and threats**
Cevennes crests and valleys	- Many goat farms and sheep farms - Maintain extensive agropastoralism - Varied farming activities (mild onions, tourism, fruits) - Maintain heritage landscape thanks to growing onions Possibility for the onion industry to become organic production Future of the wood industry Good opportunities for the dairy goat industry	- Grassland at the bottom of valleys is reduced and endangered by urbanism - Damage caused by big game - Intensification with onion growing - Issue with lands availability and access - Threat represented by wolves - How profitable is the mutton sheep sector? - Issue of maintaining subsidies (agri-environmental measures)

<u>Cevennes crests and valleys:</u>

As there are many mutton sheep breeders and dairy goat breeders in the territory, they have considerable leverage when they need it (e.g. when they defended their practices in the CAP in 2015). They continue to use extensive agropastoralism or sylvo-pastoralism because of physical constraints of the environment. The local in-place agricultural economy is maintained thanks to varied farming activities (the cultivation of mild onions, tourism, fruit production, sweet chestnut production, etc.). These productions, especially mild onion, maintain the heritage landscapes as represented by the terraces and the use of water. In the future, there will be an opportunity to become an organic producer because of the social pressure.

There is also a promising future for goats cheese including Pelardon cheese among others.

Finally there is an opportunity to expand wood industry in this area.

BUT there are also weaknesses and threats:

A lot of damage is caused by big game (wild boar, roe deer and red deer), which destroy the few available grasslands and the fences, and eat chestnuts and acorns.

There is a question about the profitability of mutton production and the associated facilities (slaughter house, agricultural cooperative, etc.).

Recommended actions for the maintenance or development of a HNV agriculture are the following:

1 -Technical actions

- Analyze the conditions required to maintain extensive pastoralism and the valorization of the products, in collaboration with our partners.
- Support research projects on these themes and share our experience between countries.
- Help organize economic and ecological pastoral diagnoses to provide technical advice to livestock farmers through a dedicated body.

2- Adaptation of regulations

- Remove obstacles to pastoral clearing.
- Facilitate the recuperation of wooded areas through sylvo-pastoralism and clearing in the framework of agro-pastoral development projects.
- Define the sylvo-pastoral technical itineraries in the new regional forest and woods program and promote sylvo-pastoral economic and ecological interest groups.
- Assess the proratization of basic payment entitlements in order to simplify its application.
- Defend the current system and upgrade it in the next CAP.
- Help small structures.
- Better target and adapt the agro-environmental and climate measures to real costs in order to promote best practices for the maintenance of open environments that are rich in biodiversity.

3- Future development of the pastoral sector

- Support the future development of the sector, in particular by promoting technical and organizational innovation.
- Pay attention to changes in the Roquefort specifications and to the dairy industry in general.
- Support initiatives that create higher local added value (organic farming, short value chains), particularly collective initiatives.
- Prepare a Causses and Cevennes brand label.

4- Support should be provided by local authorities including dealing with urban planning documents and the training of administrative officers.

5- Limit predation by wolves

- Wait for the development of methods of pastoralism adapted to the presence of wolves before considering developing it in the region.
- Exploit as far as possible, and even extend, all regulatory options to limit the introduction of this predator.

Source : CGAEER report
(Source picture : http://www.auvergne-rhone-alpes.developpement-durable.gouv.fr/IMG/pdf/infoloup14.pdf)

All the actors cited above are likely to be involved in an HNV approach but at the present time no collective approach has been built. There is only local initiative concerning the maintenance of an agriculture HNV.

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A thematic network on High Value Farming
Learning, INnovation & Knowledge

LEARNING AREA « Thessalia » (Greece)

A BASELINE ASSESSMENT

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Date: July 2017

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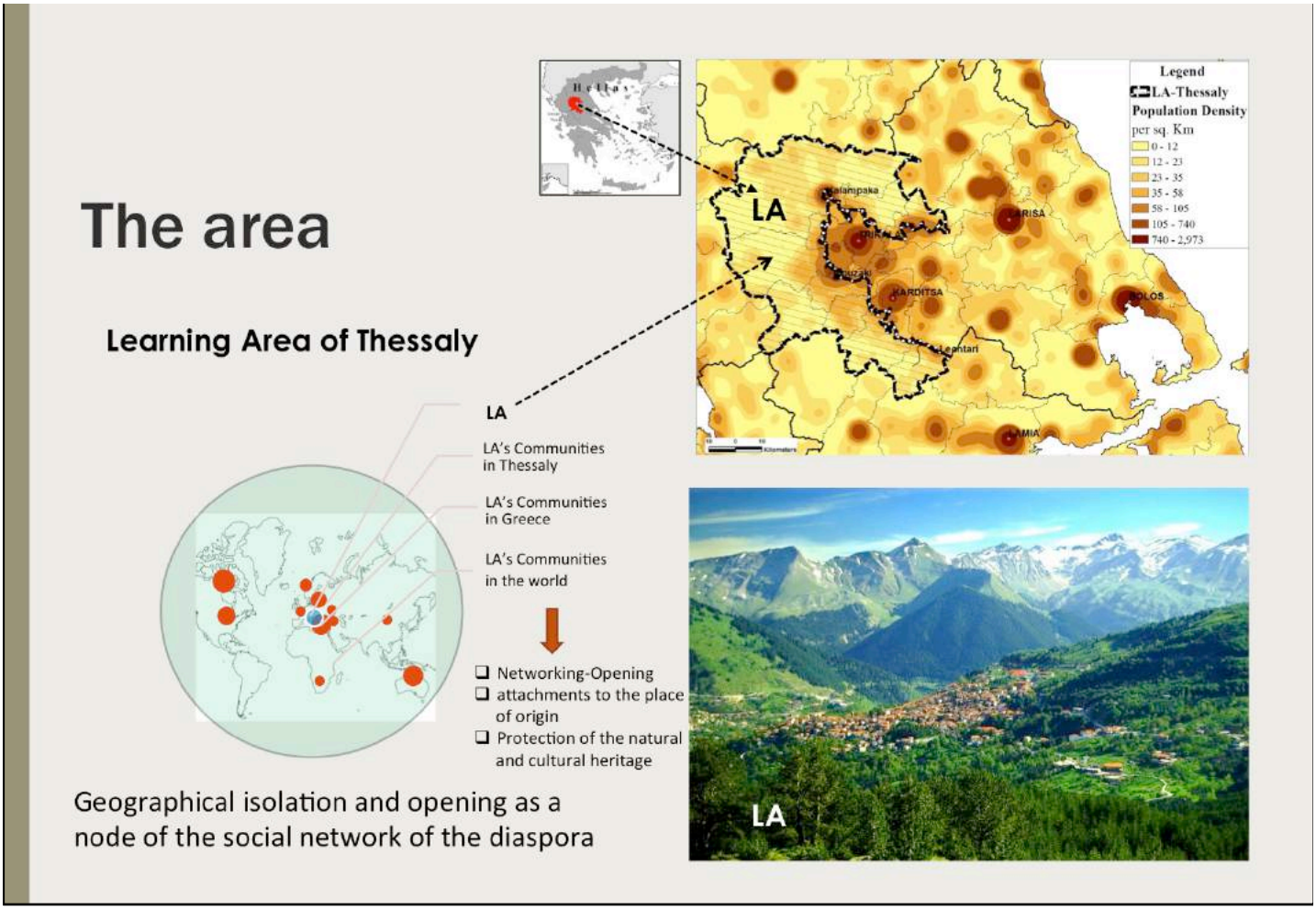
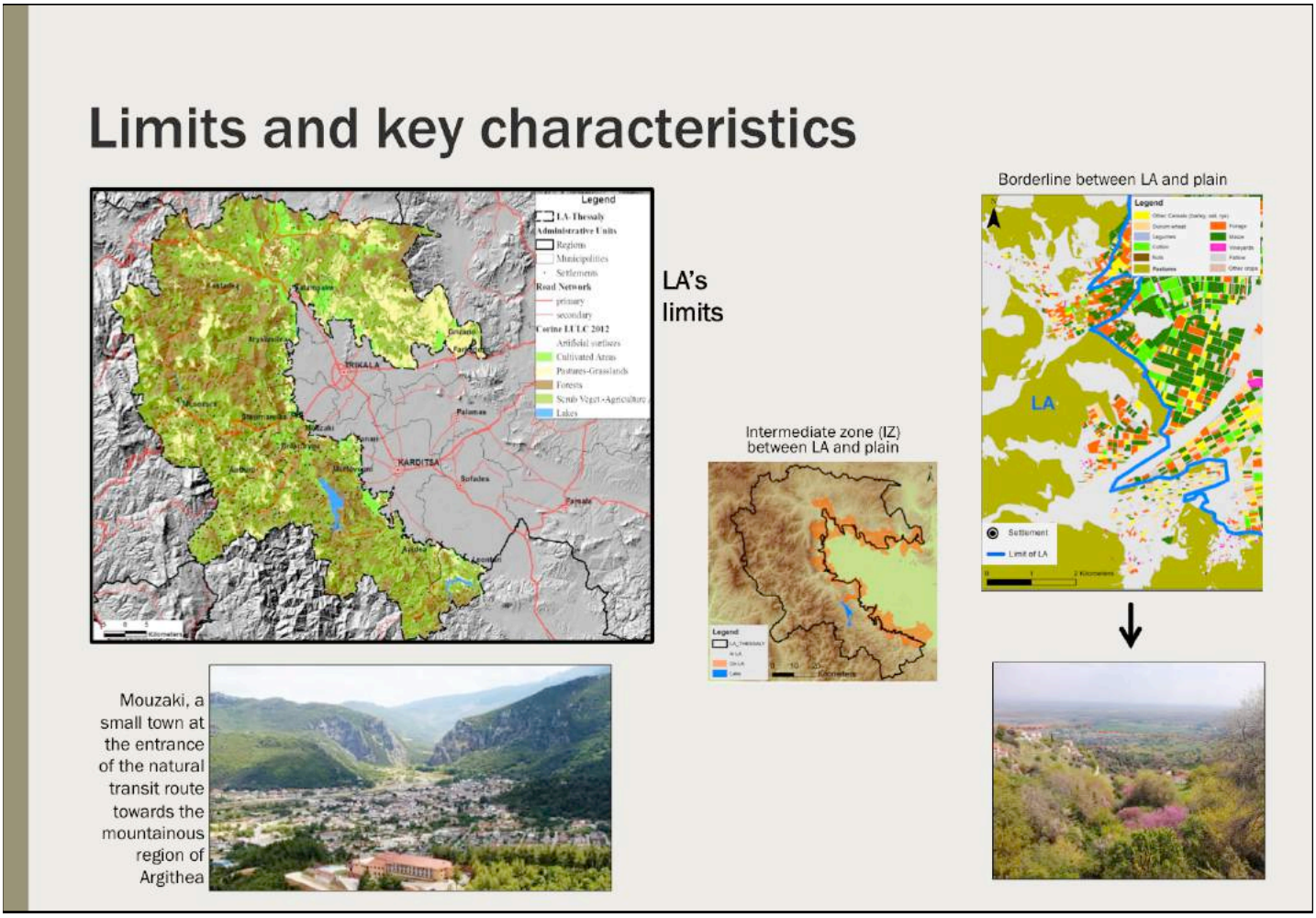


The LA is a historical and symbolic mountainous geographical unity (refuge of the resistance against the conquerors). Its landscapes strongly depict the ability of its communities to manage over time the human-animal-nature relationship in a mountain with difficult terrain but rich biodiversity. A Center of population concentration and economic activity around pastoral livestock until the 1960's, LA witnessed its workforce, labour potential being transferred within few decades in the neighboring plain, urban centers (mainly Athens, the capital and Thessaloniki) and abroad. Today, its geomorphological features, the natural resources and landscapes, its rich pastoral heritage but also its common difficulties, possibilities and prospects, reinforce LA's unity and consistency.

The simultaneous attachment at the territory and the extroversion have historically given to LA's communities the ability and flexibility to continuously adjust. Nowadays a new reterritorialisation and recovery dynamic of the LA is unfolding. The installation of new farmers is based mainly at: a) the value that society attributes to the LA as an HNV area and the recognition of its agricultural systems' multifunctional role and b) activating socio-cultural (cultural associations) and economical (control of the dairy chain) ties that LA keeps with its Diaspora.

At the same time, an innovative and integrated initiative is being developed that by valorizing a potential of actors intervenes in the relationships between LA's agricultural holdings and the value chain in which they belong. This initiative considers that recognition of the multifunctional role of agriculture in the area by consumers and the society at large, is a prerequisite for the sustainability of the HNV system. The developed participatory guarantee system integrates into the final product all those elements that, above all, guarantee the pastoral households' contribution in managing biodiversity and the landscapes.

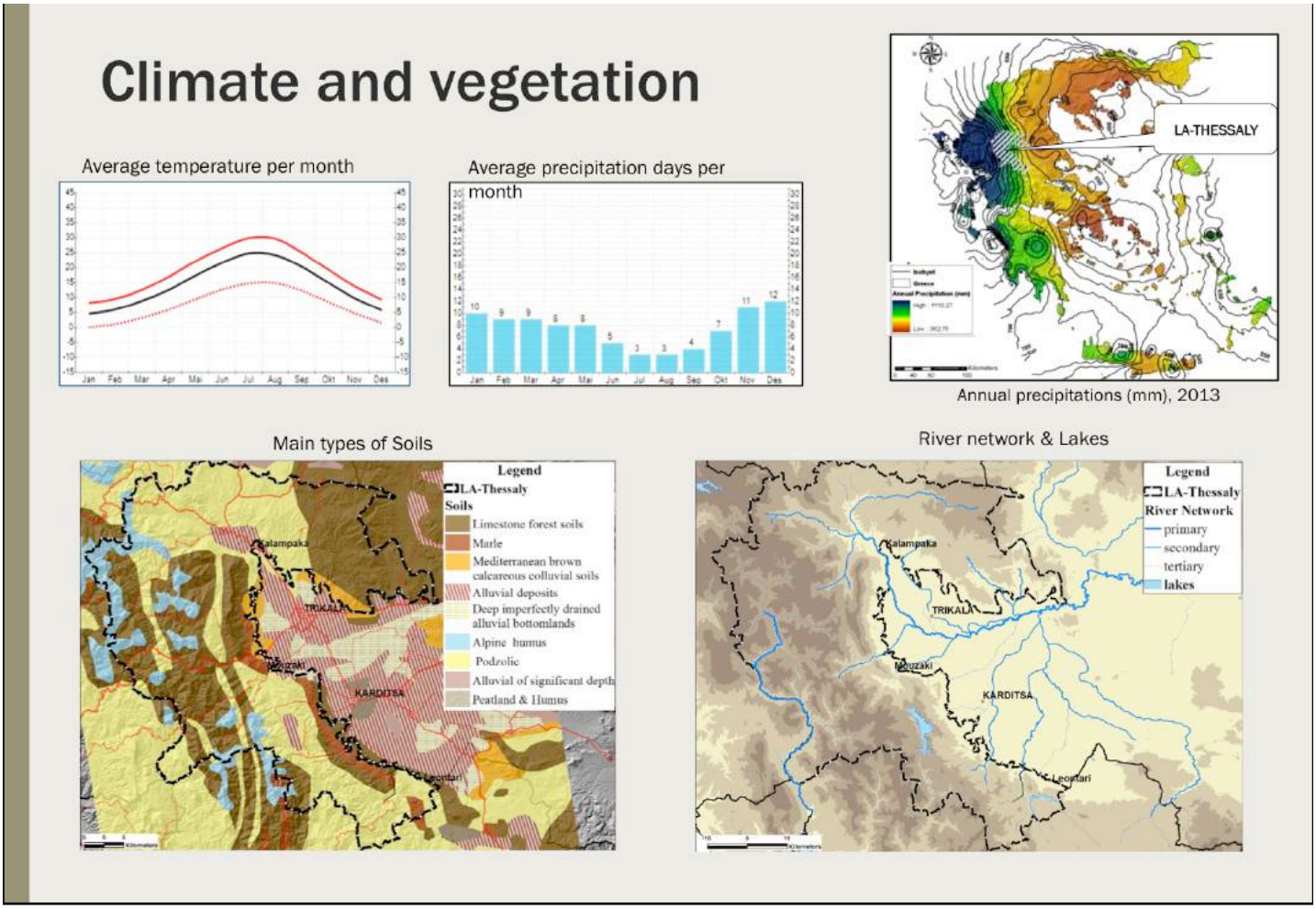
The PGS is simultaneously a tool for the control of specifications related to the maintenance of HNV production systems and a tool for the promotion-guarantee of these characteristics towards consumers. The objective of the PGS is thus auditing, informative and educational, opening a communication channel between HNV producers and producers more or less aware/not aware. Therefore it is not marketing that conserves biodiversity but consumers' actual recognition of this value through the preference of the products. This is a bottom-up initiative that contributes to the producers' understanding of the value of the HNV production



LA is defined by the ridges on the west of central Pindus and the ridges on the north of Chasia/ Antichasia mountain (administrative limits with the Regions of Epirus, Central Greece and Western Macedonia respectively). LA surrounds the plain of west Thessaly and the separation line with it, forms LA's eastern boundaries. LA, a closed area with no internal openings-basins is characterized by natural passages leading to Thessaly's plain. At the entrance of these passages there are small cities. It covers 4200 Km^2. The altitude ranges from 250 m to 2,400 m. The main land cover is wood vegetation (shrubs and trees with some openings and arable plots). The area is characterised by a persistently dicreasing population, small-extensive livestock farming and small-scale agriculture.

The 145 LA's communities (296 settlements) are entirely outside the plain. On the contrary, the 48 communities whose surface is intersected by the LA's delimitation line and whose agricultural land is in the plain are a separate "Intermediate Zone (IZ)". This zone maintains close links with the LA, being a place of permanent or winter installation for the LA's herds and a forage production area for mountain livestock breeding.

Despite the LA's administrative division-between two regional units (Trikala and Karditsa) and among 7 municipalities two features reveal a perception of community, through the awareness of common problems, new perspectives and the need for joint action: the drafting by the 7 municipalities of a common plan for sustainable development (2016) as well as their joint decision to create a support center for the HNV farming systems (2017 within the HNV-Link project)

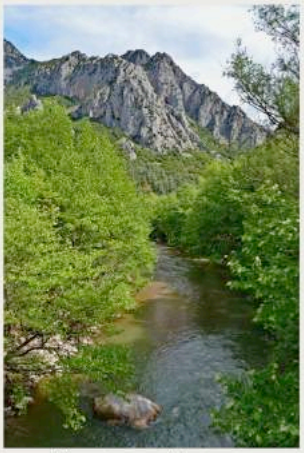


From a geological point of view, LA is characterized by two types of rock material: a/ At the plain's edge a mass of Oligocene marly (limestone) sandstone leans on the first slopes of the flysch which form a first line of 900 to 1,000 m hills. b/ To the west the mild slopes formed on the flysch give their place to much steeper slopes, formed by limestones, until the summits. Pedologicaly, acidic soils rich in organic matter (coming from forests) and clay (podzolic soils) dominate the area. Moreover, soils with greater content of fertile substance (humus) are present at a lower rate. Most soils are gravelly or red (terra rosa), rarely deep, characterised as superficial formations.

LA is covered by two slightly different climatic zones. The first spreads over the LA's foothills. In a strip about 20 km wide from the foot of the mountain, rainfall is much higher (>800 mm) than the plain. Early autumn rains shorten the drought period. The second zone concerns the LA's inland and is characterized by a mountainous Mediterranean climate with a significant drop in the average annual temperatures. There are plenty of snowfalls and rainfalls (annual precipitation height over 1,000 mm). There is a dense network of watercourses, plenty of groundwater resources and many springs. In the westernmost part of the, LA major rivers like Achelous and Pineios, originate. The LA is the sole water provider (irrigation and drinking water supply) for the Thessaly plain.

Geomorphology and vegetation II

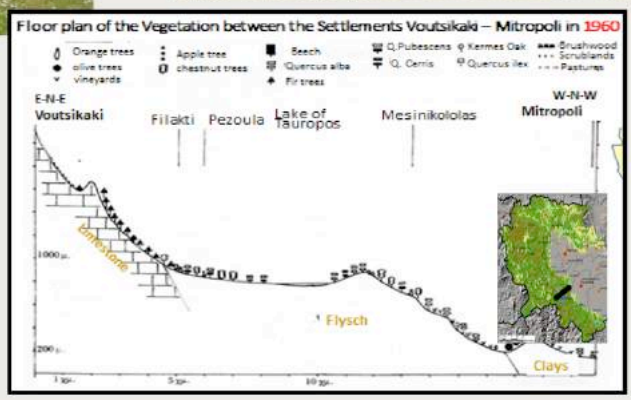
The vegetation type of the LA is a mosaic of dense forests, openings, permanent pastures and mixed herbaceous/ agricultural areas



Plane trees, alder trees

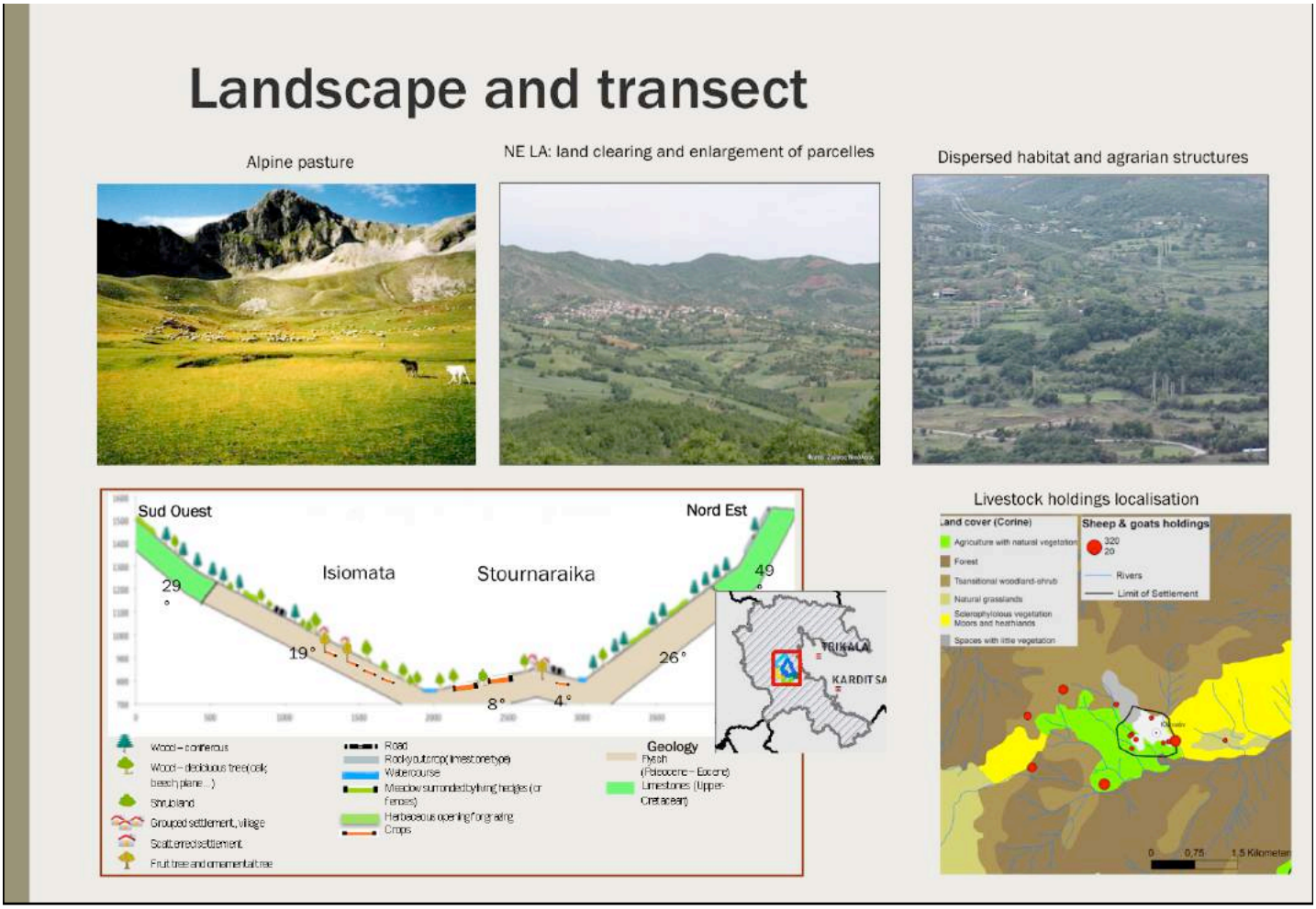
Land Cover/Land Use	Area (ha)
Mixed Herbaceous vegetation/ agricultural areas	194500
Forests	142000
Pastures-Grasslands	57400
Cultivated Areas	21000
Lakes	3000
Artificial surfaces	2100

Data and Categories of Land Use according to Corine 2012



At LA's medium elevations evergreens and broadleaved vegetation i.e. Mediterranean elements, prevail. Then a zone of oaks follows and at higher elevations Coniferous trees are dominant, with most characteristic the black pine (*Pinus nigra)*. At the same time even higher trees of beech and white pine appear. Between 1,400 m and 2,600 m *Pinus Leukodermis* emerges. Land cover at this height becomes sparse. The treeless and steppe-like pastures appear higher in altitudes.

The area, due to the existence of several types of plants and certain combinations, could be thought as the border between a mid-European and a Mediterranean environment. The distribution of the temperatures and rain falls do not create particular problems in vegetation. As a result of grazing, new plant formations are appearing (fern, kermes oak, phrygana…). There is intense vegetation along the watercourses (plane trees, alder trees). Finally, the limestone soils (Koziakas zone) is the area where kermes oak *(Quercus coccifera)* grows, always accompanied by *Phillyrea media*, and gives a shrub vegetation or a formation of micro-shrubs from non-edible species (*Poterium spinosum, Phlomis fruticosa* etc).



The characteristic agricultural landscape is formed on the slope of small valleys on top of which the settlement is established (concentrated or scattered). Cultivated land usually extends after the settlement, including any arable surface in the two sides of the small river that flows down the valley.

Depending on the population reduction the cultivated parcels are scattered, while the rest are abandoned, fallow land or used for grazing (grass or not).

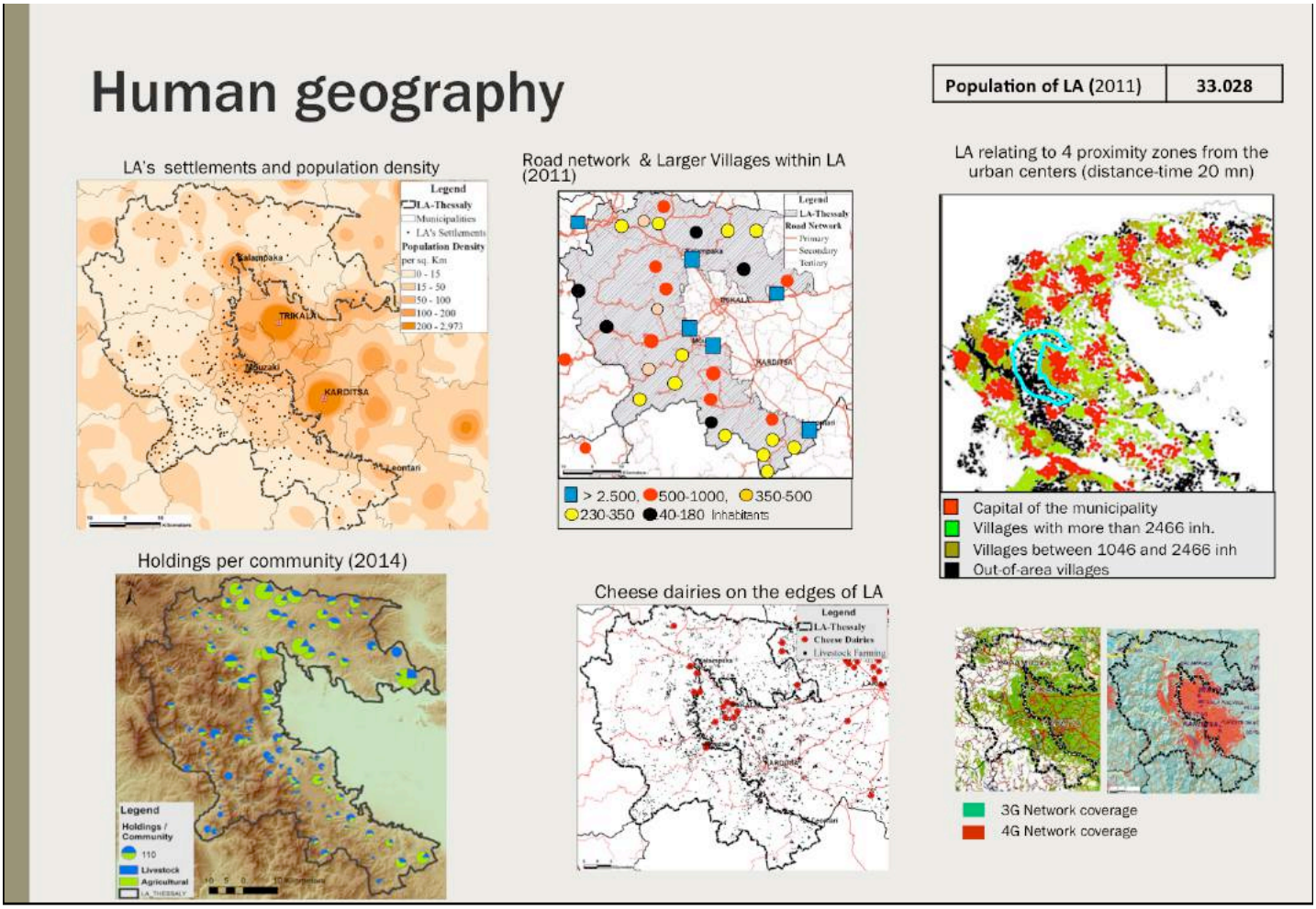
In higher altitudes non-irrigated crops are located while irrigated land follows the river. Small orchards surround the village while, in many cases, livestock farms are scattered within this agricultural land, the small herds within the limits of the settlement. The evolution of this selective abandonment explains the forest and kermes oak invasion and the impacts at the neighboring habitats (densification of the riverside plane forest, abandoned pastures).

Pastures are located in higher altitudes, circumferentially and relatively far from the village where flysch prevails and in mush higher points, when the territory is limestone. Between the village and the pastures, forest is inserted. These pastures are used mainly by transhumant and big permanent herds. Gathering the herds in nearby or high-altitude, but easily accessible pastures where infrastructure exists, creates over-grazing phenomena.

HNV 1: All pastoral holdings, with some small exceptions at the south part of central and northeastern LA. Holdings with smaller herds use the pastures next to the village and larger ones use the most remote (600-800 m altitude) and higher (alpine) pastures.

HNVF 2: Every crop and mixed agricultural holding of W and E LA and the mountainous part of NE LA. They currently manage the zones of agricultural land that are either in a state of less or more advanced abandonment (W LA, small villages) or in preservation (big villages of E LA). The farmland with lower percentage of semi-natural vegetation create in a complex mosaic landscape with arable and/or perennial crops

HNVF 3: The relief in north-central and south northeastern LA offers more grazing and arable land especially towards the plain. Land clearings there, are more significant. However, the cultivated crops are rather oriented



Population- cities- transportation

- 33.028 inhabitants distributed in 297 villages. Disturbed residential network (9 settlements have nowadays, an aged and aging population between 500-1000 inhabitants). The population is served in towns located at the LA's limits and the cities of Karditsa and Trikala (80.000 and 60.000 inhabitants respectively). Its' road network addresses to the needs of livestock breeding, tourism and Diaspora's movements but the relationship time-distance/services still remains problematic. During summer, the population in villages is multiplied, due to the arrival of transhumant farmers and Diasporas' return in their homeland. West LA is more sparsely populated and with less permanent activity (it is dominated by transhumant farmers).

Economy:

Based on pastoral farming, small-scale agriculture and on agri-tourism. In the total active population (30%) the primary sector is estimated to represent approximately 60% (4,084 farmers of which 800>65 years old). Agricultural products oriented towards feedstuff and self-consumption. The milk is processed at cheese dairies in the plain that belong to entrepreneurs originating from the LA. Local products' like flour, aromatic plants, desserts, trout, honey, etc as well as services (restaurants, accommodation, laundries and alternative forms of tourism) are offered to both Diaspora members and tourists~~)~~. Limited logging activity.

Institutional:

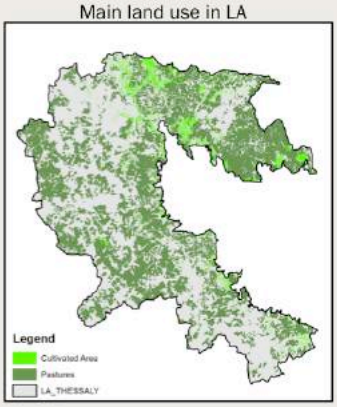
Spatial and Development planning should be viewed in the context of a national institutional framework oriented towards a decentralisation process as well as of E.U's policy measures on environmental protection, sustainable development and participatory planning. The latest administrative reform (2010) resulted in the consolidation of the LA's settlements in 7 extended municipalities, at the expense of participation: the old, demographic weakened, communities remain oriented towards the Diaspora communities failing to integrate into the new governance forms. Livestock farmers less willing to participate in cooperatives. Instead, individual farmers establish informal professional relations with cheese makers. At the same time, cultural associations of the Diaspora organized in federations as well as the appearance of novel co-operation initiatives could be perceived as indications of a social capital formation process.

Users:

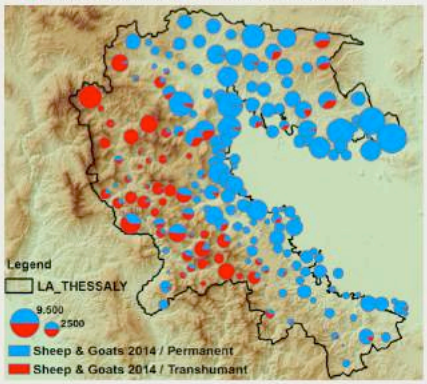
Permanent, settled and transhumant producers and "providers" of touristic services. Diaspora's associations active in the protection of natural and cultural heritage and the diaspora members individually as land and house owners. Local public administration and the municipalities increasingly become actively involved in natural resources management. The role of the two (2) development agencies (LAGs) is also important for the operational planning and successful implementation of

Agriculture: key facts

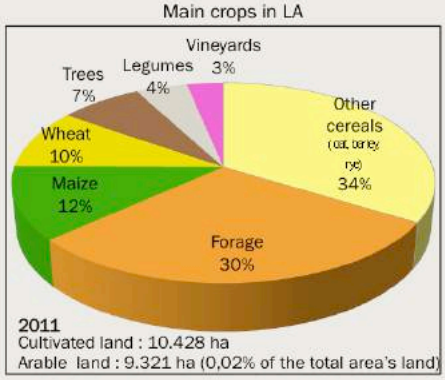
Main land use in LA



Permanent and transhumant animals



Main crops in LA

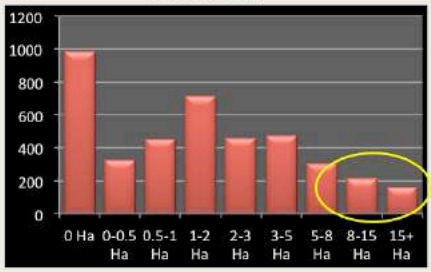


animal species	animals (Nb)	Holdings (Nb)
Cattle	24,596	589
Sheep & Goats	297,220	2,538

Farming system

- Small cropping holdings
- Small mixed cropping holdings
- Pastoral systems
- Transhumance

Distribution of farms based on the size of their cultivated land



Pastoral sheet & goats' holdings in LA			
	(2011) permanent settlement	transhumant (summer staying)) (2012)	%
Herds	2012	333	16.5
Animals	297,220	108,023	36.3
Average	177	324.4	

LA's agricultural holdings (4.084) remain attached to managing low-intensity HNV systems which is positive for managing the biodiversity landscapes. Only in some cases (NE LA) while HNV farmlands' ecological habitats, like semi-natural pastures, are still a functional part of the holdings, some of them are trying to intensify agricultural farming scattered within the community in the framework of mixed system or by choosing land concentration instead of livestock farming. Only a few abandon livestock farming and focus exclusively on agricultural activity, gathering the scattered abandoned parcels and addressing the needs of other small farmers for mechanical tasks and the needs of local livestock farmers for forage (green fodder, legume, wheat hay).

Pastures are mainly public and communal. Agricultural land is limited to the natural passages' valleys. Extensive and transhumant livestock is dominant utilizing local animal breeds and pastures of the area. Free-range cattle's breeding is oriented towards meat production. Crop production remains to traditional products (forage, vineyards, legumes, trees etc.). The important position that mixed holdings possess, based on their number and contribution, in agricultural land and biodiversity management, is not attributed since they are evaluated and are funded based on the value of their production. The important position that mixed holdings possess, based on their number and contribution to the agricultural land and biodiversity management, is not attributed as they are registered (and strengthened) based on the value of production and the economic efficiency of the holding (economic size methodology). Intense decrease of permanent holdings mostly in west LA. Transhumant farmers are covering this gap with their herds (333) whose average animal number (324.4) is twice that of non-transhumant (177 animals). Choosing the pastures and organizing the grazing follow traditional distribution rules (family tradition, size of the herd). Abandonment of remote pastures and over-grazing of nearby pastures and parcels is observed, even in a small radius around the settlement, part of which is included at the livestock holding's grazing system.

The holdings' large decline resulted mainly from the large accumulated number, between 1960-1970, of senior head farmers who paused their activities. It also conceals internal structural changes caused by the creation of new holdings (new farmers and pensioners). Lately, there has been a shift towards sheep breeding, cattle and mixed holdings and partially towards new dynamic cultivations by the new entrants. On the contrary the number

Agriculture: key facts

Number of holdings per category of economic size and productive direction (IOMS*/2011)

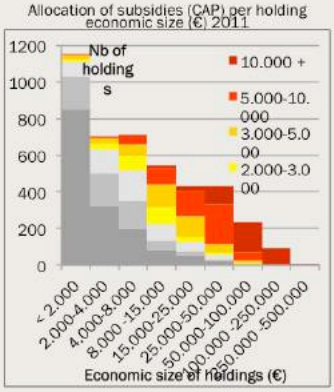
Economic size classes	Type of farming	Arable	Dynamics agricultural	Livestock holdings except cattles	Cattles	Mixed	Undefined	Total
	< 2.000	537	303	136	0	9	363	1348
	2.000-4.000	257	165	208	4	32	6	672
	4.000-8.000	159	142	243	7	40	4	595
	8.000 - 15.000	87	91	301	6	32	0	517
	15.000-25.000	33	45	206	19	38	0	341
	25.000-50.000	36	27	179	66	32	1	341
	50.000-100.000	6	0	45	126	4	0	181
	100.000 - 250.000	1	2	14	65	1	0	83
	250.000 - 500.000	0	0	3	3	0	0	6
	Total	1116	775	1335	296	188	374	4084

* IOMS: Integrated Operating Management System

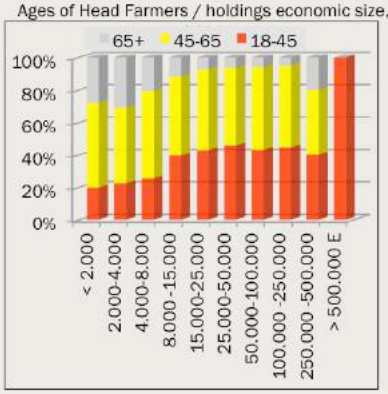
Specialised perennial crops per category of holding economic size 2011

Economic size classes (€)	Type of holding	Olive trees	Wines	Vegetables & flowers	Other permanent crops	Polyculture	Total
	< 2.000	122	18	1	47	108	296
	2.000 - 4.000	24	16	1	57	58	156
	4.000 - 8.000	4	9	1	78	46	138
	8.000 - 15.000	0	3	0	57	25	85
	15.000 - 25.000	1	0	0	26	16	43
	25.000 - 50.000	1	0	1	18	7	27
	50.000 - 100.000	0	0	0	0	0	0
	100.000 - 250.000	0	0	1	0	1	2
	total	152	46	5	283	261	747

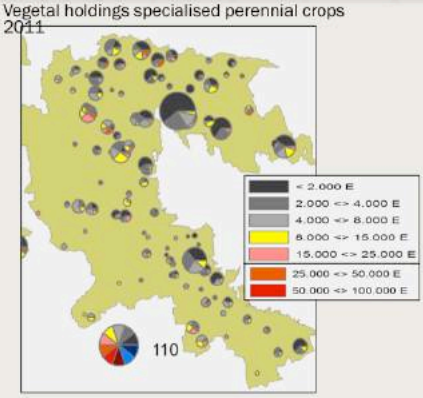
Allocation of subsidies (CAP) per holding economic size (€) 2011



Ages of Head Farmers / holdings economic size, 2011



Vegetal holdings specialised perennial crops 2011



38% of LA's holdings have an economic size <2,000 € and remotely benefit from Community aid. However, part of this percentage results from the division of the herds between members of the household. On pure agricultural holdings this percentage is even bigger (72%) (Division for taxation purposes).

A promising element: 20% of head farmers is <45 years old, a percentage that is successively largely increasing in bigger categories of economic size revealing a significant renewal.

The pure and mixed livestock holdings are the most dynamic (50% >8,000€) and even more so the free-range cattle holdings (66.5% > 40,000€). That is why they enjoy the greatest aid from CAP.

50% of vegetable holdings with specialised perennial crops are characterized by small size (<4,000€). The more dynamic holdings are occupied with arboriculture, vineyards and polyculture. Those categories attract new farmers due to demand for their products by the market.

Low productivity in sheep milk against high fat yield. The local breed (Boutsiko) gives approximately 100-120 lt annually and the crossed local (Chiotiko, Karagouniko) from 160-220 with 7.6% and 6.5-7% fat respectively. Milking machines are not widespread. The 4,084 LA's holdings have just 250 tractors (1.5 tractor/settlement).

In terms of products, cultivated forage, various cereals and maize are absorbed by local livestock farming or by local forage merchants. Milk is mainly collected by the 17 cheese factories of the Thessalian plain. Part of the produced milk is made cheese at the village and is sold at the farmer's close family and friends representing an average of 15 to 20%. Low meat value (very low prices and non-inclusion in PDO status).

Landscape and transect

Agro-ecological units

Agro-ecological units - Description

C : Flat zone of cultivation protected by the low mountain relief

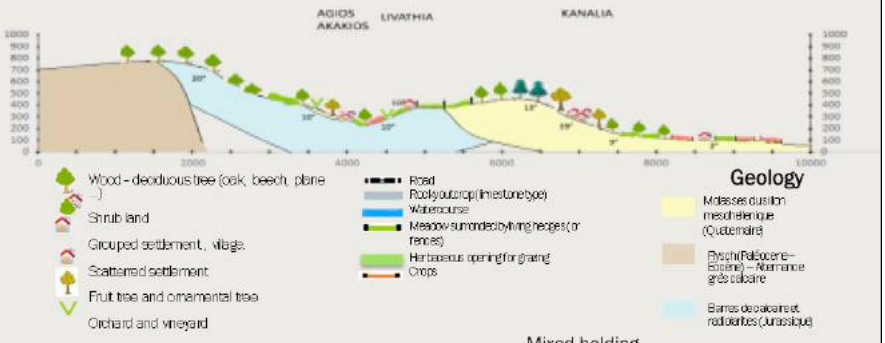
CP : Collective pasture on the side of the mountain directly facing the the plain

P&C: Pasture and culture in small parcels, divided by living hedge or small woods with

W&R: Wood and rocky outcrop on the top of the mountain, stip sides and abandoned parcels

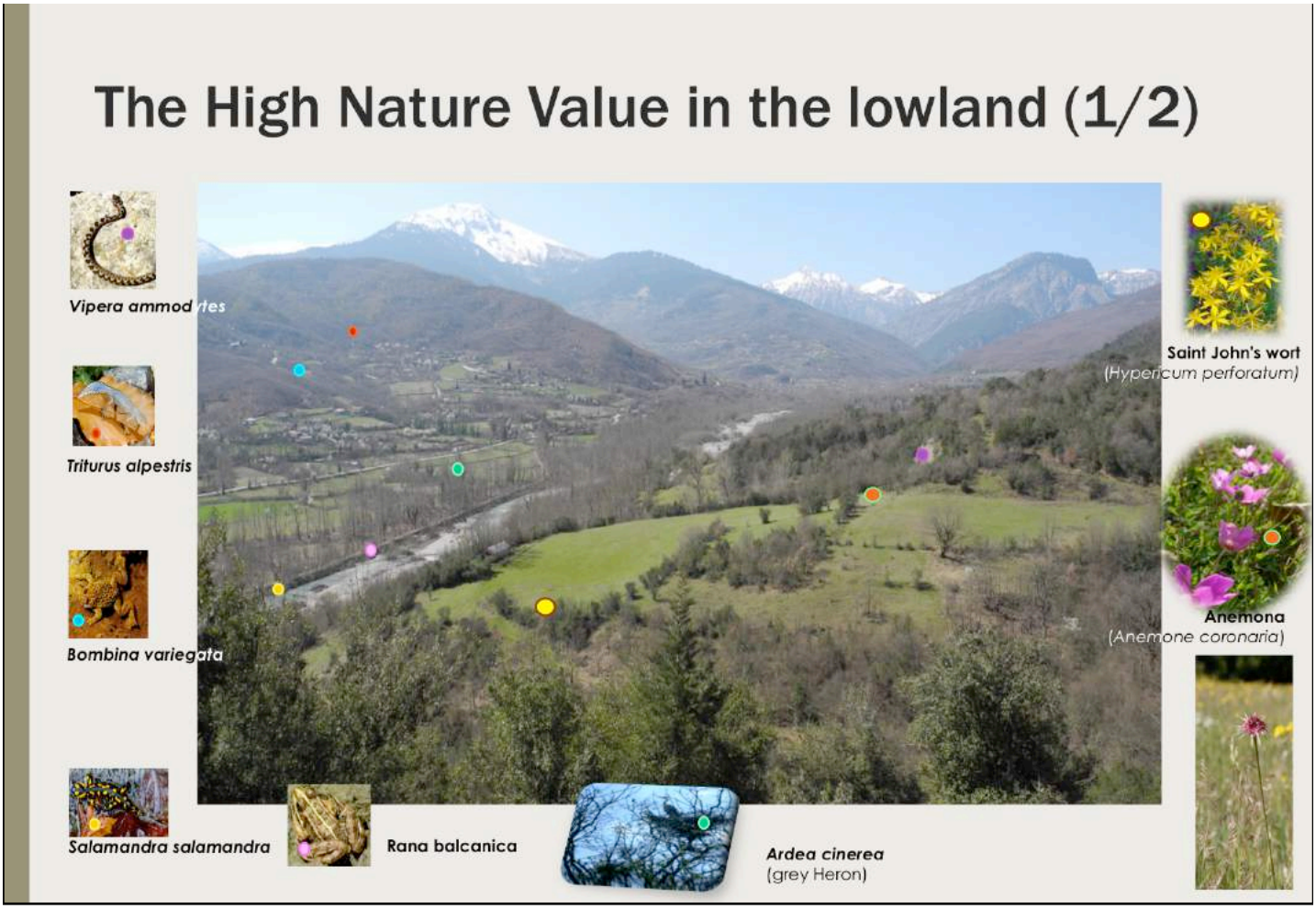
C&W: Culture and wood on the flat banks of the lake

Transect area P & C



Mixed holding

The landscape functions have already presented in slide No 5.



There was no causal link between biodiversity and production system during the definition of HNV areas in our country. This relationship should be studied. In other words, for every plant and animal species (bird, wild animal, reptile, plant…) we should locate the agricultural infrastructures, practices and techniques that should remain and be developed in order to preserve and strengthen their population. The existence of pastoral farming combined with the small extent of hunting contribute to the existence of natural elements (flora and fauna)

Three are the main linkages of the rich biodiversity existing in the LA and farming.

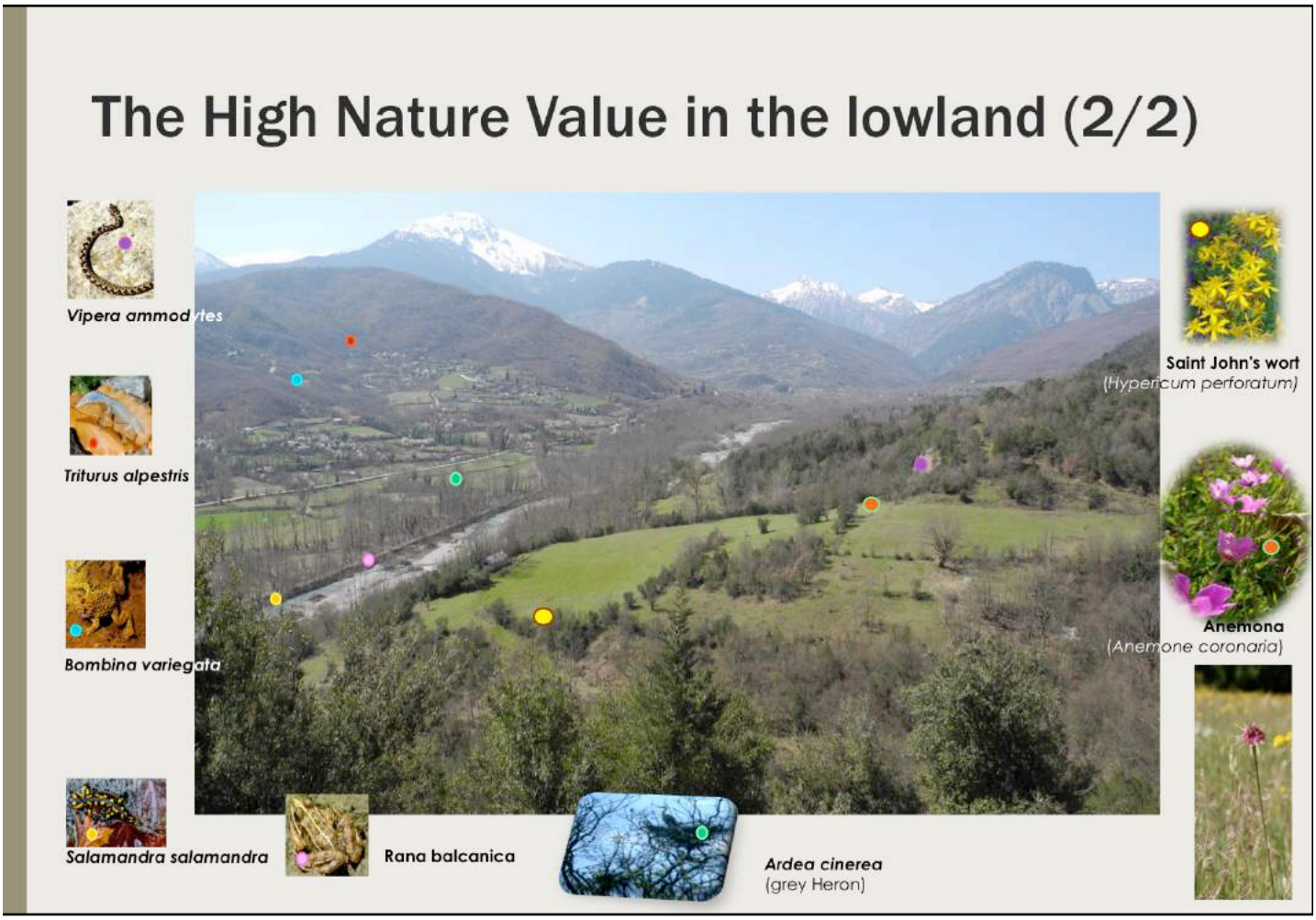
a. The pastoral management of flocks in the case of sheep and goats. The movement and the longtime of outdoors permanence of flocks, is an enhancing factor for predators and carrion eating animals.

b. The interface points and ecological routes (e.g. intermediate zone between pasture and agricultural land) of the subsystems are very extensive and scattered in the area. Those are the richest in biodiversity. The mosaic landscape with the mixture of land uses and management practices applied, includes features like hedgerows, tree fences, terraces, streams as well as small ponds, single trees and bushes, clumps etc. creating thus a network very valuable for biodiversity.

c. The small size and the disperse character of individual plots has as a result a very high complexity and an increased length of the transitional areas within the mosaic.

The LA hosts a high faunal diversity, includes many important Bird Areas as well as threatened species. At least 67 bird species have been recorded. The Plastiras mountain lake is the habitat of an amazing bird fauna. The Greece European flora, with 850 plant species recorded only in its territory, could make the territory one of the best botanical places of the world. LA's flora also includes a great variety of medicinal and aromatic herbs.

As far as LA's flora is concerned the endemism rate can exceed 35%. The area comprises more than 650 species and subspecies.



Significant flora species in low and medium altitudes

Saint John's wort (*Hypericum perforatum*): Medicinal herb from which the famous therapeutic balsam oil (valsamelaio), is produced. It grows in pastures of low and medium altitude, as well as in abandoned

Anemona (*Anemone coronaria*): typical wild flower that grows in the pastures, ~~we~~ it can be found ~~it~~ in low and medium altitude (200-800m). It blossoms during May-April.

Important fauna species in low and medium altitudes

Grey Heron (*Ardea cinerea*): It is found in flooded meadows, rivers or fields of the area. The presence of the water coming from the Plastiras lake favored significantly the increase of its population. It exploits the lake and the rivers of the area in order to feed itself (fish, amphibians, invertebrates) while it nests (small colonies) in high trees at the banks of the lake.

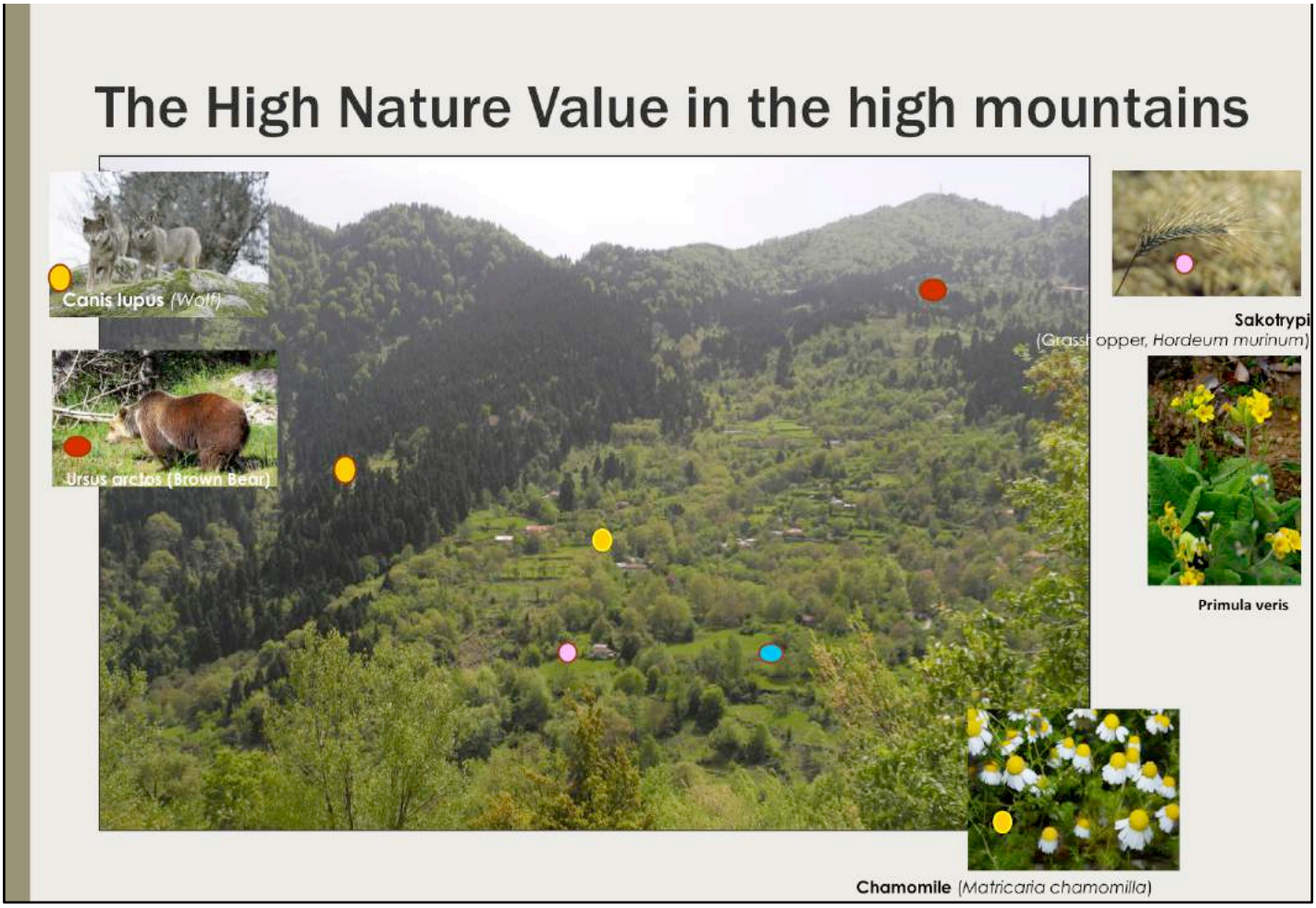
Vipera ammodytes *:* It is found in low and medium altitudes, often in rocky places

Triturus alpestris *:* It is found in high-altitude water collections

Bombina variegata *:* It is found in small, mountain water collections

Salamandra salamandra **:** It is found in middle and low altitudes, close to water or shady forests.

Rana balcanica : It is found in almost every water collection of middle or high altitude



Important fauna species in high altitudes

Canis lupus (Wolf): It is found in areas with satisfactory coverage of trees and shrubs and food sufficiency. It avoids high altitudes. It goes higher than the forest boundary only when it travels. It feeds on a variety of preys (roe deers, wild boars, hares, sheep and goats, small mammals, reptiles or even invertebrates and also on dead animals or plants. It usually forms small packs that mainly move within the zone with the oak forests of the area.

Ursus arctos (Brown Bear): It lives in deciduous forests (oak, beech) or coniferous forests (black pine, fir) of the mountainous and semi-mountainous zone at altitudes from 800-2000 m. As an omnivore, it feeds with a variety of foods that finds in the forests of the area (all kinds of fruits, bulbs, honey, roots, stems, grass, small and big mammals, amphibians, reptiles, insects etc.). A lonely animal, that constantly keeps moving in between the above ecosystems

Ardea cinerea (grey Heron): It is found in flooded meadows, rivers or fields of the area. The presence of the water coming from the Plastiras lake favored significantly the increase of its population. It exploits the lake and the rivers of the area in order to feed itself (fishes, amphibians, invertebrates) while it nests (small colonies) in high trees at the banks of the lake.

Important flaura species in high altitudes

Sakotrypi (Grasshopper, *Hordeum murinum*): Typical grass that participates in the composition of species of the grazing grassland flora of the area. Its population is favored by the conservation of pastures due to extensive livestock.

Anemone (*Anemone coronaria*): typical wild flower that grows in the pastures, we can find it in low and medium altitude (200-800m). It blossoms during May-April.

Chamomile (*Matricaria chamomilla*): Aromatic herb with smoothening properties. It grows in lowland, semi-mountainous and mountainous pastures. Its ecological requirements are favored by extensive livestock.

Primula veris: It is found in medium to high altitudes

Lifting motivation for the extermination of wolves and the creation of a body (Arcturos-NGO) for the protection of the bear resulted in the increase of their population. The existence of a significant sheep/goat and free range cattle livestock in the area attracts these animals for food search.

The time line

Explaining the present with the past

An overall view of the time line

up to 1960's
Traditional productive system

1960-1980's: attraction of the plain

1980-2010: Entrance to the E.U. (1981)

2010 +: The crisis: an opportunity for the LA?

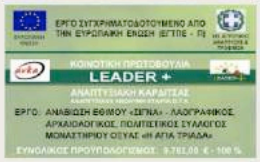










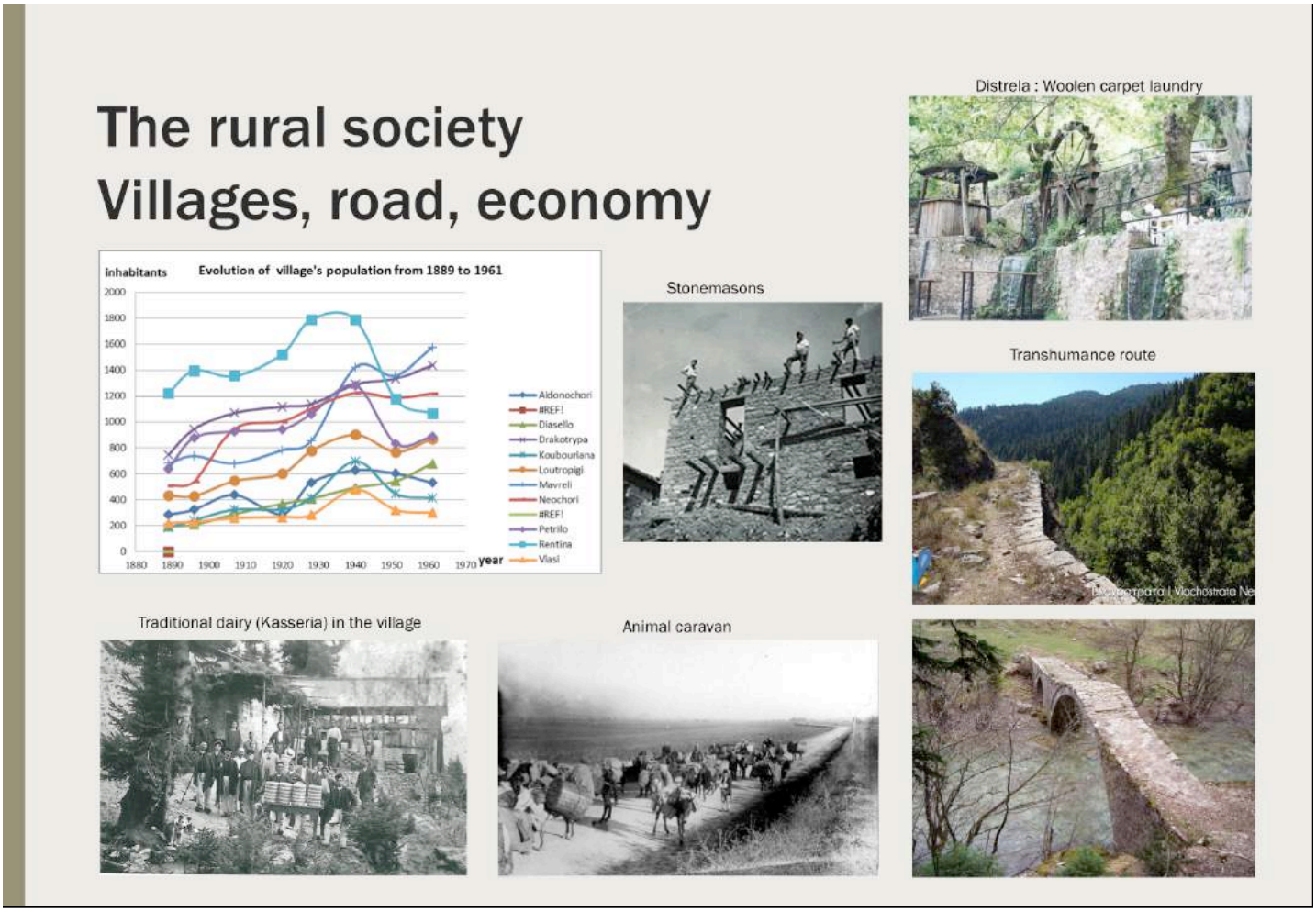


Heritage from the past

The pre-modern legacy

Up to 60's : Knowledge inherited by managing sustainably the system humans-nature-animal on the mountains

Importance of transhumance and complementarity of resources



A mountainous society with significant specific cultural characteristics, materially and morally supported by 19th's century immigrants. At the beginning of the 20th century education rate for both sexes, was much higher than that of the plain.

Continuous population growth between 1880 and 1960 with the exception of the 1940s when LA, due to the resistance to foreign occupation forces, suffered major disasters by German occupation (1941-44) forces (burning down of all its main villages) as well as during the Greek civil war (1946-49). During the 1960's, the area regains the 1930's population reaching 114,000 inhabitants. The settlement pattern includes a central village at the North of the LA while at the central and the south, a lot of small settlements around the central big settlement (average distance 3-5 km). However, only 16 of those main villages (145) had more than 1,000 inhabitants.

Local economy was based on pastoral livestock farming (big and transhumant herds) and mixed agricultural holdings which provide for local cheese, textile, wool and leather processing artisanal industries. Milk was collected by local cheese makers in their in situ facilities. There was important activity around cottage and artisanal industries (flokati (woolen blanket), clothing, flour mills, dristelles (traditional washing of woolen articles). Difficulties in transporting timber limited logging to the mere fulfillment of household needs. Household economy was supported by diversifying activities towards traditional crafts (construction, wood processing, coal, rock). Transportations of personnel and goods were taking place with animal caravans through an extended road and path network with bridges for the movement of herds. The area of north Pindus supplied Central Europe with cheese and woven textiles i.e. capes and blankets.

The competent ministries considered that the mountain did not offer any potential for development hence it should not be considered as a habitable space. They simply suggested abandonment by its inhabitants and reforestation of the land (1955-1980 Sivignon M).

Farming

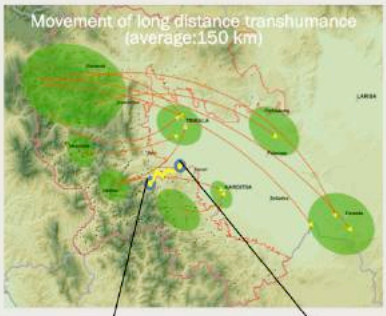
Men and Women, Farms, Products, Markets

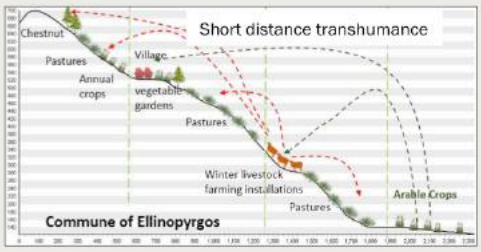
1)Small mixed cropping family holdings (polyculture and livestock)
2)Pastoral livestock of large, medium, small transhumance

Animals	1911	1961
	Nb	
Cattle	17.175	20.993
Sheep	162.062	262.877
Pigs	9.257	7.076
Goats	104.280	133.727
Arable land	18.416	26.865

Big transhumant herds

Small sheep herd embedded at the agricultural family holding





LA 1911 and 1961: Basic Crops

1911	Ha
Maize	7457
Wheat	7121
Vineyard	1849
Rye	833
Tabacco	794
Oat	667
Legumes	444
Sesame	388
lucerne	370
vetches	132
Trees	129
Barley	117
Onion	93

1961	
Nb of holdings	16.745
Trees (ha)	307
Vineyard (ha)	1.150
Arable (ha)	26.865
Meadows (ha)	2.132
pastures (private) (ha)	11.213

Ex: medium distance transhumance (25 km)

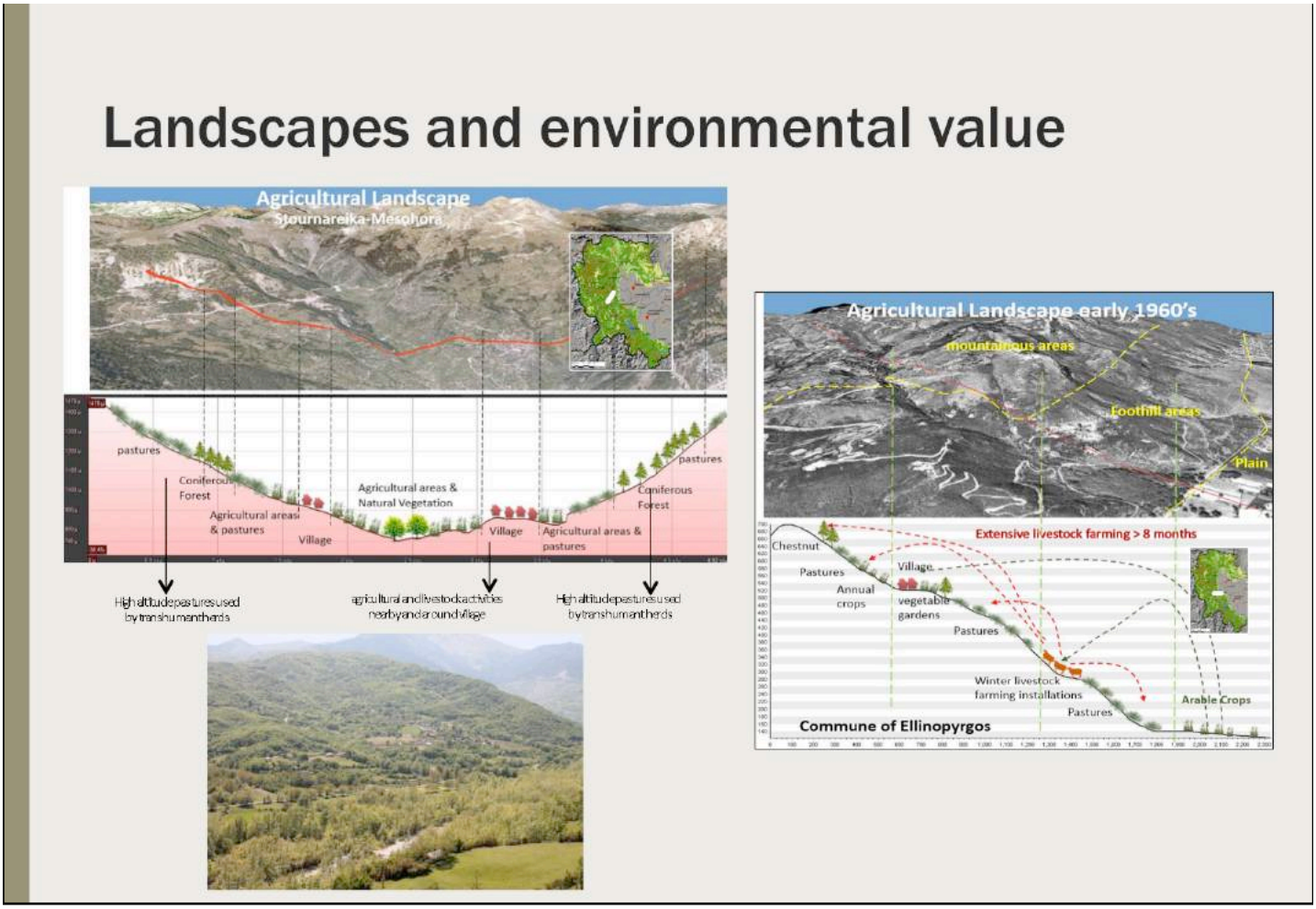
Eastern LA: mixed agricultural holdings and small /medium sized herds are dominant. The western LA was characterized by the presence of big herds (most of them transhumant) due to the abundance of pastures. Cultivation practices e.g. irrigation methods have not changed, since centuries**.** The production of the mixed agricultural holding was oriented towards the herd's needs and to ensure the familiy's self-sufficiency (potatoes, beans, lentils, chickpeas, barley, corn, chestnuts, apples, vegetables, forage etc.). Livestock holdings were supplying local textile as well as wool and leather processing crafts. Cheese-making was made mainly within the family and only part of the milk was collected by local cheese makers who, nevertheless, had their settlements in-situ.

The herds' movement was distinguished in large, medium, short transhumance (approximately 200,000 moving sheep and goats). The herds of large transhumance were organized in "Tseligato" (cooperation of many families in groups of 3,500-5,000 animals). Tseligato's weakening and dissolution coincide mainly with the important and rapid reduction of winter pastures due to land clearing that resulted from the radical agrarian reform (1925). At the same time, bureaucracy's indifference (or even hostility) for transhumant farmers and the mountain's pastures has been more than obvious. According to the Ottoman system of the "tsifliki", the community kept on its limits large areas of pastures located in less fertile parcels/surfaces or where the soil was swampy. The reform (1925) significantly reduced these surfaces by allocating them for agricultural use at farming families. The end on the use of these surfaces as pastures was imposed not only by the ownership segmentation but also by their cultivation with winter cereals.

When comparing 1911 and 1961, an important increase in livestock is revealed, especially in sheep breeding. In semi-mountainous areas winter pastures remain and after the reform (1925) while land clearings start in the 1960's. There was much lesser increase in goat breeding due to the restrictive measures already imposed by the state. This evolution largely explains the big increase in annual crops. On the contrary, permanent crops like trees and vineyards were reduced. Studies at the beginning of 1960 already indicate the impact of these changes e.g. degradation of pasture, increase of soil erosion phenomena etc.

The reform, land clearings and conversion of pastures into agricultural land took place only in the plain and not in the mountain. What is more, livestock farmers (transhumant) started getting (after their settlement in the plain) involved with agriculture and other professions as well in the plain, a fact that contributed to the reduction of herds. The demand for products concerned the 4 basic products: meat, milk, wool, leather. Concerning meat, the Greek diet was mainly based on sheep and goat meat because the consumption of beef grew massively in Greece after the 1970's. That is why for the following decades Greece has been characterized by a 70/30 proportion on crop and animal production. These are annual

Women are specialized in milk and wool processing in the household, while men specialized in livestock breeding, logging, transportations and as craftsmen. In the multi- active communities and families when movement outside the LA was necessary (e.g. craftsmen), agricultural activities were undertaken by women: hay transfer, creation of small dams in order to irrigate etc. Women also moved to the plain of Thessaly for seasonal hired employment as agricultural labourers (cotton, fruit, olive collection, hoe etc).



The main landscapes formed in the LA are the pastures (very high-alpine and medium altitude) and the zone of the small-mixed cropping family holdings around the village. The adjustment of farming systems by local societies to the quality of the soil and the relief was linked to the historical specialization of their communities and has a direct impact on the way of organizing the agricultural economy and on the landscape.

In NW LA (Aspropotamos area) the village is built in a clearing, surrounded by forest, while the pastures are in the ridges. There is no cultivation, the houses didn't have orchards, only some fruit trees (for cultural reasons and due to transhumance since it mainly concerns the semi-nomads Vlachs). The villages' arrangement followed the ridge in order to better exploit the pastures.

On the contrary, in the center (Mesochora area) and the south (Agrafa area) the slopes are formed on terraces that define the limits of very small fields. Every flat surface was cultivated. An irrigation channel system contributed to the creation of a domesticated Mediterranean landscape (clover and maize). Their houses are scattered in small settlements in order to accommodate the spatially and temporally fragmented cropping pattern. Pastoral activities were complementary to cultivation. Finally, in Chasia's area the villages are built in high altitude, on the slope, near irrigable gardens utilising the pastures between the village and the forest. This is the case of Greek-speaking population who follows a moving pattern without the family that remained in the village in order to work with agriculture. The demographic increase between 1950-1960 had an impact on land use, due to an increase in the number of animals. There was over-grazing in some communities, but, in general, collective management systems of the common resources ensured a balance in the distribution of agricultural activities among the various landscapes (alpine and medium altitude pastures, cultivated area) and in the preservation of natural resources (no deforestation, no serious landscape and ecosystem degradation). Observation of a rich biodiversity at the end of the 1960s attests the great value of the

Period 1

Changes from 1960 to 1980 : The attraction of the plain: cities and intensive agriculture

Changes in the rural and social context

Attractiveness of the city and the plain : a massive exodus in a 20-year period

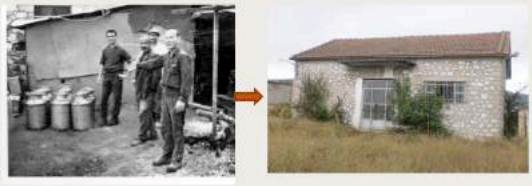
- Decrease in the number of agricultural holdings and acceleration on the reduction agricultural activities
- Settlement of the semi-nomads in the semi-mountainous and lowland western Thessaly. Some continue transhumance

Population / Villages	1961		1981
	Legal*	Real	Real
30 big villages	37,406	28,473	18,158
7 small town	18,893	19,620	20,003
Total	56,299	48,093	38,161

* The legal population includes the transhumant families and the immigrants

first roads, first buses in LA

Improvement of cheese-making infrastructure and equipment



Dorms for the students from the mountainous villages of the LA

Migration to urban centers (Thessaly, Athens, Thessaloniki, abroad):

- Local economy remains agro-pastoral while artisanal products were marginalized. Many holdings' income was enough just for subsistence.
- Mechanization of agriculture in the plains resulted to a massive descent in the demand for farm labour, subtracting thus an additional source of income for the pastoral households
- Attractiveness of modern way of living in the plain especially when compared with the harsh conditions of mountain agriculture and transhumance (residence, movement, living).

Women participated in outmigration. By sending remittances to the family, they ensured household survival and children's education. In parallel, another exodus was taken place by the permanent installation of transhumant farmers in winter settlements (chimadia) where the community's bases were transferred. This extended community network three nodes: village of origin, Diaspora, permanently established farmers. The next generations originating from LA villages grew up in this network context connecting the LA and the outside world. Outmigration mainly concerns villages and families that are not at all or partially involved with transhumance. They have mixed production system and after the end of the civil war outmigration were the most important and direct means of supplementing the family income and securing the family survival. In the second case the permanent settlement of transhumant farmers in the plain is mainly related to the radical advances achieved in the plain concerning infrastructure, education, working conditions etc.

Between 1961-1981, a 64% decrease in population of the villages was observed (with small settlements especially affected). Agricultural towns located in the foothills presented an increase by 3%, now the only "nearby" LA's “service towns” while the increase for the urban centers reached a 15-35%. Population from very small settlements started gathering in neighboring large villages. Young people focused towards pursuing secondary and tertiary education. At that time, dorms have been constructed at Mouzaki (small town localized at the foothill of the LA in a place that is the natural entrance to the LA) for students from remote villages of the LA.

Public intervention: provision of infrastructure i.e. electrification, water supply, transportation network extension

Agricultural development in the period

Transfer of the socio-economic networks of the settled or transhumant breeders in the plain

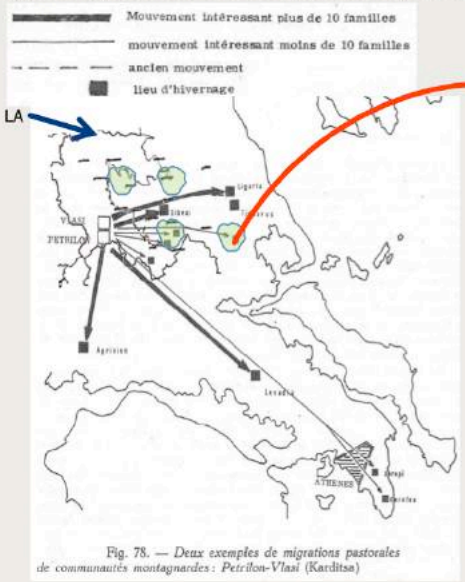
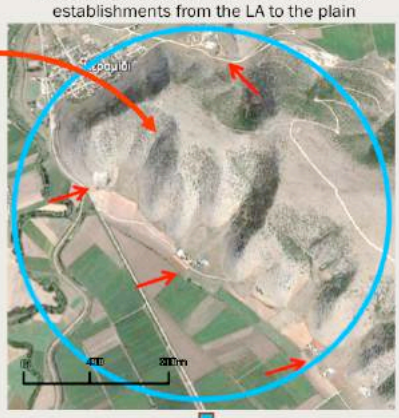


Fig. 78. — *Deux exemples de migrations pastorales de communautés montagnardes : Petrilon-Vlasi* (Karditsa)

Positions of breeders' winter or permanent establishments from the LA to the plain



Area of informal cooperation between small cheese-maker and breeders originating from LA

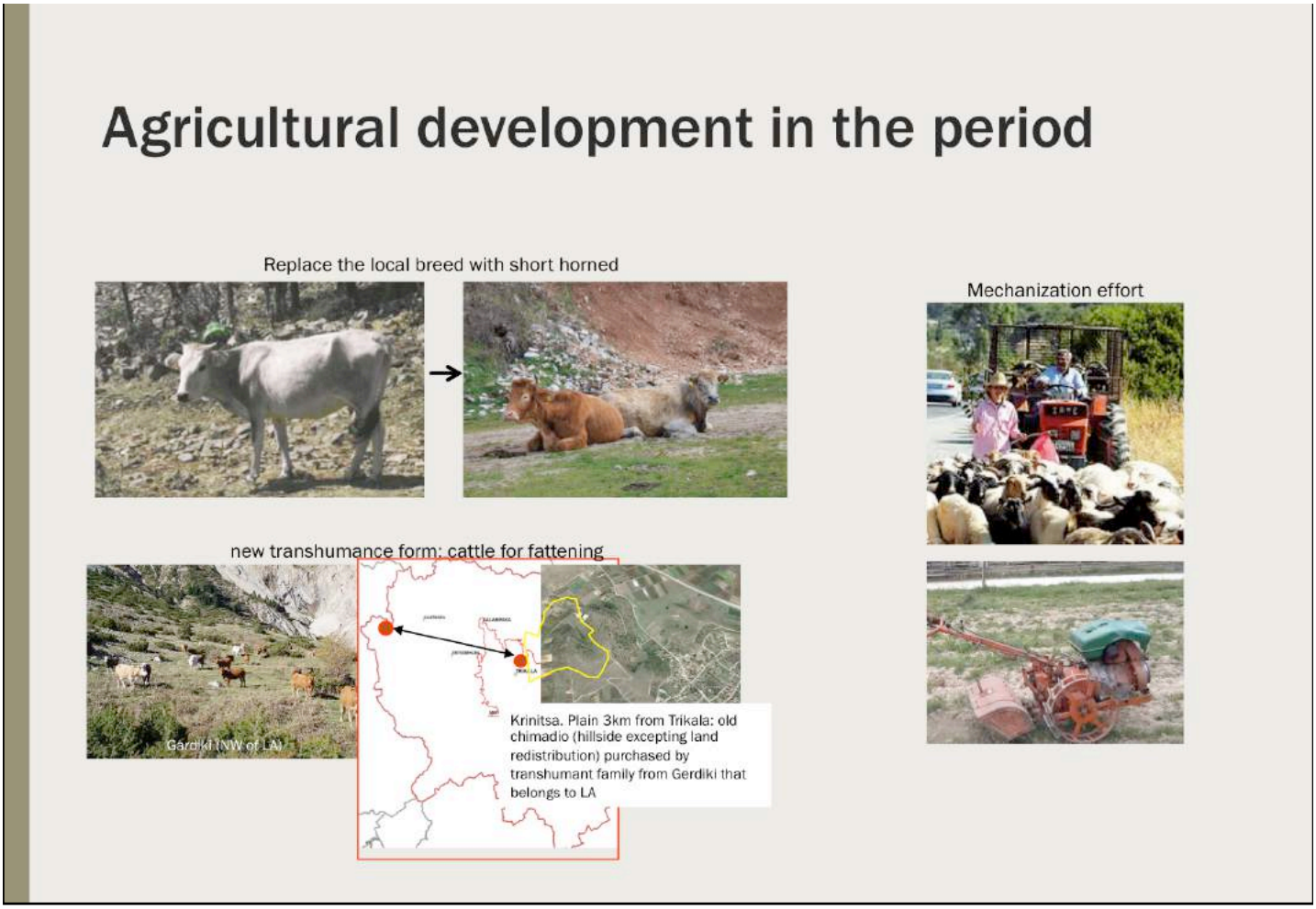
Herd transport modernization

The 1960-1980s have been characterized by the prevalence of the intensive model in the plains. Agricultural modernization obscured the picture of mountain agriculture that remained in the traditional production structures and practices. In addition to that, there was no specific policy measures designed for mountainous agriculture. The main incentives for mountain producers this period are: a) economic aid for animal transhumance, b) small loans for forage purchases and c) advance payments by cheesemakers for the milk. They are supportive measures that contribute to the liquidity of the holding and the family but don't address productivity issues (improvement of breeds, consultation etc). On the other hand, a series of problems and counter-incentives existed, mainly linked to the forest's protection against sheep and goats (especially the latter): i.e. introduction of afforestation plans by the Forest Service, grazing management plans imposing 5-year exclusion of the herds as well as premium for the slaughtering of goats.-

However, the reduction in the number of sheep and goats observed has been slower than that of the the number of holdings in the area. Hence, an increase of the average herd was observed. The reduction in the number of goats was more pronounced, due to public policy priority to protect the forest. The basic organization forms of pastoral family sheep and goat breeding still remained intact and in particular that of the transhumance since it received subsidies for transportation.

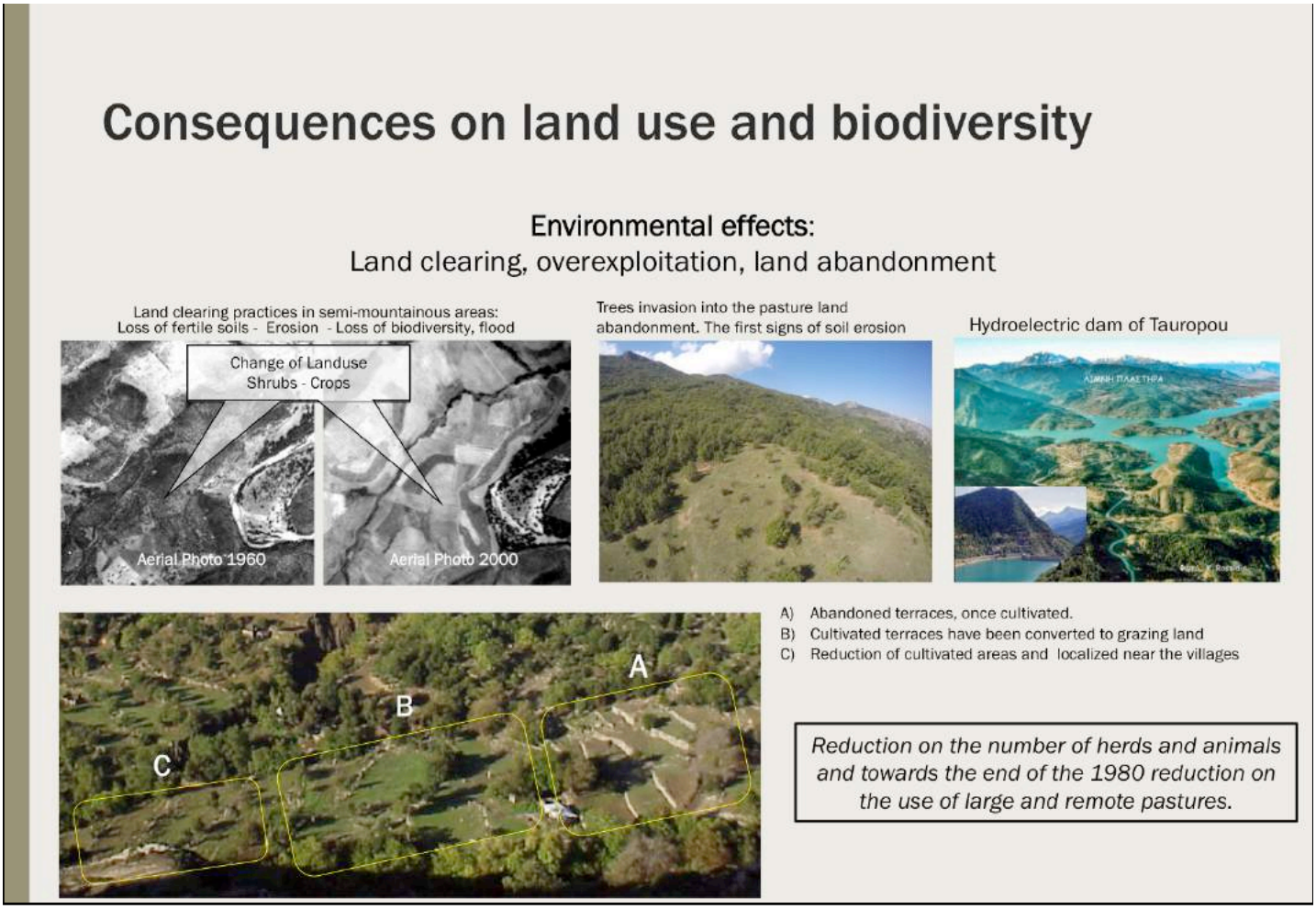
They moved to summer (mountain) pastures on ~~with~~ trucks and to ~~in~~ the *chimadia* (winter settlements in the plains) on foot (duration 3-6 days) using the grazing areas along the route (animal gestation period). E.g. the route from the mountainous Gardiki to Grammatiko in the plain (130 km) takes 4-5 days with three stops.

During the winter, cheese-making was transferred to the plain around the *chimadia*, integrating transhumant and permanently settled herds. Cheese-maker comes from the same mountainous community as the farmers. The mountainous community continued to be connected in the plain by the same solidarity and reciprocity socio-cultural bonds and commercial relations. In this relation context, dairies paid in advance farmers, part of the expected production value in prices slightly higher than those of indigenous farmers.



The national Policy for livestock has been limited to target mainly import substitution (beef, pork, poultry) through supporting the creation of meat producing livestock farms with low-interest loans. In parallel, since late 1960s governments tried to keep sheep and goats' meat and milk at low prices through imports. At the same time, the markets are overwhelmed by the more competitive dairy and agricultural products from the plain, forcing out mountain products (Reduction on the prices of basic foodstuffs for the consumers of the city).

The only changes observed in mountain livestock concerned crossbreeding with improved local or foreign breeds. The local breed of shorthorn cow (robust, abstemious, long-lived, highly reproductive and suitable for work) was replaced by crossed, more productive but energy intensive cows that were, moreover, difficult to move on the slopes. Also, some sporadic efforts for mechanization by few producers have been observed, with small machinery adapted to the conditions of mountain agriculture. Cultivation of forage, support of employment in livestock farming, transformation of some farmers into small entrepreneurs that provide mechanization services to other farmers.



Pastures' and agricultural land abandonment

Changes in the agro-ecological management within the LA, the boundaries of the community and the settlement:

1. LA's level: Interventions of Forest Service to protect (expand) the forest against the sheep and goats through regulating grazing, without any farmers' involvement (i.e. disregarding indigenous knowledge, excluding their practices and experiences from the Forest Service Improvement Plans). At the same time, land clearing of pastures in LA's semi-mountainous communities and change of their use into agricultural was not uncommon.

Another important intervention at the LA level has been the creation of the hydroelectric dam and Tauropos' lake (24km^2) in eastern-central LA and the total inundation of 6 communities' and their agricultural land whose inhabitants were transferred to the plain for permanent installation.

2. Community's level: a) Abandonment of small settlements around the villages and remote pastures, began coinciding with simultaneous over-grazing of the nearby ones (late 1970s), b) abandonment of the remote agricultural zone where dry farming was practiced (winter cereals: wheat, barley, rye) and limitation of the cultivated areas on ~~in~~ ~~the~~ irrigated zones around the village (maize, clover, legumes) and c) gradual abandonment of higher terraces (A) available for wheat (import from plain) and simultaneous usage of some abandoned parcels for grazing. Medium height terraces (B) are used as grassland and the lower (C) as vegetable gardens for family consumption.

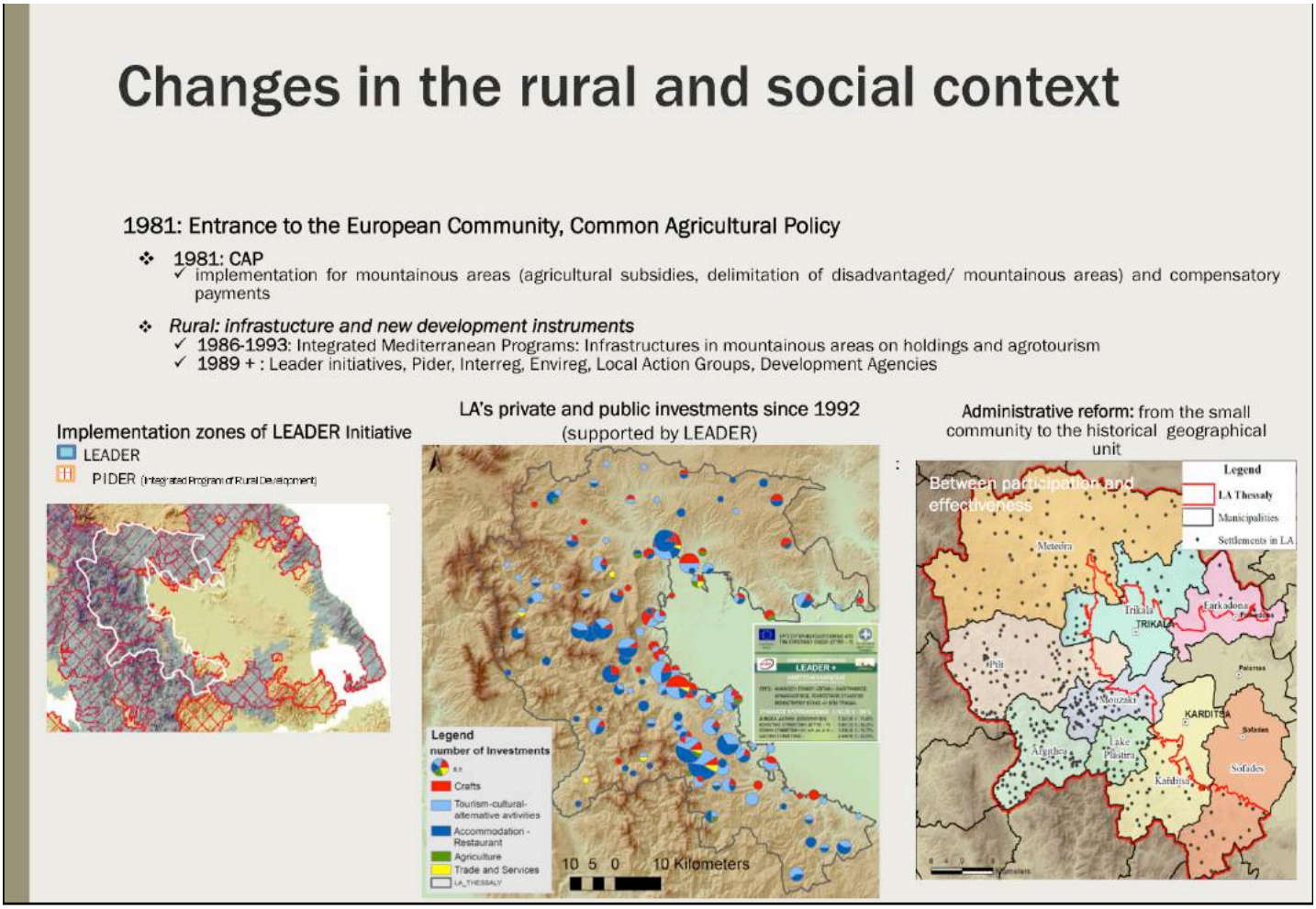
First signs of changes in landscape and biodiversity. From the biodiversity point of view the main changes are:

- Extinction of Balkan lynx (*Lynx lynx martinoi*).
- Population decline of specific species such as brown bear and wolf.
- Population decline of predatory birds since 1970's.

The degraded kermes oak ecosystems in lower altitudes tended to characterize the area. There are also signs of mismanagement in the broadleaf oak ecosystems.

Period 2

Further Changes from 1980 to 2010 : Entrance to the E.U. (1981)



Development policy measures targeting rural areas: The Integrated Mediterranean Programs (1986-92) have been the precursors of the Community Support Frameworks in the area as in all Southern Europe. They provided mainly for infrastructure construction. Later new development instruments were deployed both within European Community programs and initiatives (Leader initiatives, Pider, Interreg, Envireg).

Two have been the main elements of the consecutive years of implementation. First the provision of infrastructures in mountainous areas to support farming and rural tourism. During that time, financing for hostels, hotels, restaurants, etc. began, scattered within the LA, based on the attractive landscape, easy access and relatively short travel time. The second was the creation of the conditions for a integrated management of the countryside, investing on the potential revealed by the appreciation of the multiple functions of rural areas, with the Local Action Groups and Development Agencies (establishment in 1990s) as the main facilitator.

This latter could be thought as the third major outcome of the implementation of EU policy measures, since the principles of the participatory, democratic planning in the framework of the above programs were introduced and new forms of consultation have been adopted and established. A great part of the investors come from expatriate communities (diaspora). Individual investments combined with collective schemes for the production, promotion and marketing of local produce (pasta, confectionery, textile products, aromatic herbs, beeswax candles, liqueurs, etc) incorporating endogenous knowledge and know-how (e.g. 6 womens' cooperatives).

Administrative reforms towards decentralization aiming at the optimal elementary administrative unit level. They give the opportunity and the tools to rural areas to plan for their future

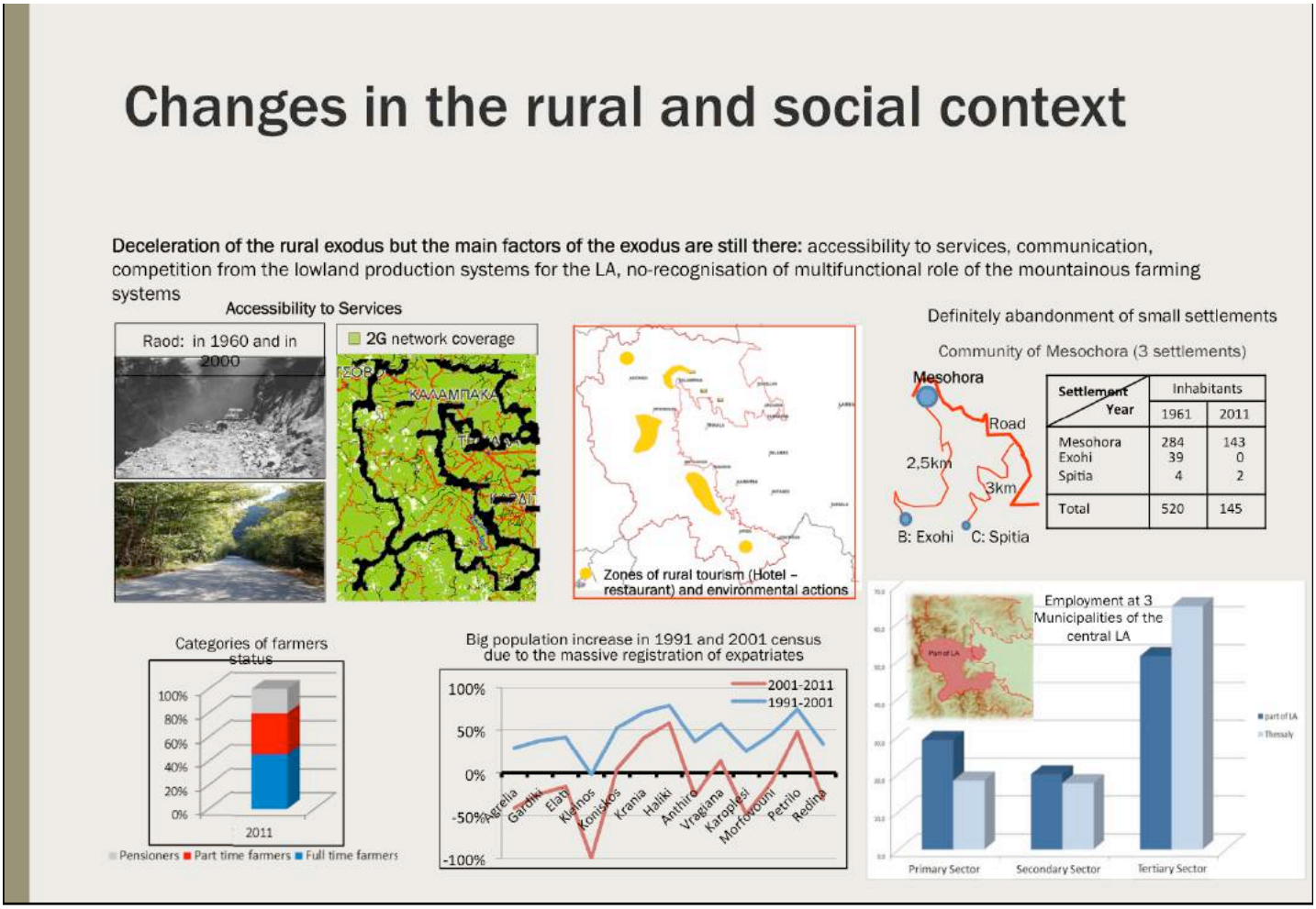
1997: First administrative reform (less municipalities, elected NUTS III authorities), law for spatial local planning (land use),

2006: The first law for the operational planning at Municipality level (elected authority), LAU 2,

2010: Second Administrative reform (less and stronger Municipalities LAU2, elected NUTS III)

The enlargement of the new administrative units creates issues of citizen and community participation.

The new reform, in pursuit of efficiency, creates larger administrative units that cause malfunctions for two



The LA acquires better accessibility due to the improvement of the road network, but access to the Internet is still difficult. Many LA's villages in the winter, especially the most remote ones, remain empty, under a guard's supervision. The abandonment of small villages is completed. In 1991 and 2000, the expatriates (diaspora) participated massively in the respective official population censuses in all LA's villages, to express their solidarity and interest (holiday residence, protection of heritage, etc.), to their origin communities.

Fundings' bigger part is oriented towards hostels and small hotels and even more in restaurants and taverns. The tourism development in LA is identified mainly inside:

a. villages revived by the seasonal presence of the expatriates (diaspora), having been converted into holiday residence villages, and the arrival of 333 transhumant herds (western LA). This is more the case of internal tourism powered by the friends of the Diaspora members that counts thousands of members and lately by the development of agri-tourism (nature lovers, participation in the numerous and big festivals in the LA). This particular economic model of tourism has almost nothing to do with tourism in Meteora.

At the same time, hostels/hotels are created in most of them, financed by LEADER programs and the contribution of the associations of the expatriates.

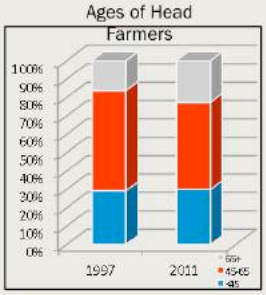
b. dispersed tourism zones (Pertouli and Plastiras Lake). There is a significant diversification in the employment of the local population in these areas.

Inside the LA, the multi-employed heads farmers now represent a significant part of all heads farmers.

Agricultural development in the period

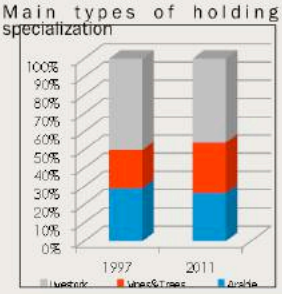
- **1990s:** CAP payments' restrictions, Rural Development Programs, Organic farming, Protected Denomination of Origin-Protected Geographical Indication
- **2000s:** CAP review, single farm payments, organic livestock, delineation of HNV areas, environmental awareness in CAP and RDP, cross compliance

Ages of Head Farmers



Ages classes	1997 Nb	2011 Nb	1997 %	2011 %
<45	1413	1286	29%	30%
45-65	2641	2032	55%	47%
65+	783	976	16%	23%
Total	4837	4294	100%	100%

Main types of holdings specialization

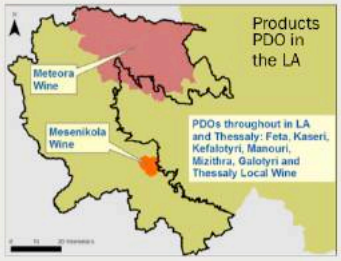


Holdings specialisation	1997 Nb	2011 Nb	1997 %	2011 %
Arable	1388	1073	20,5	17,6
Vines&Trees	995	1129	14,7	18,5
Livestock	2393	1874	35,3	30,8
Total	6773	6087	100	100

Evolution of holdings

	1961	2011
In LA	16826	4299
IZ *	11235	7229

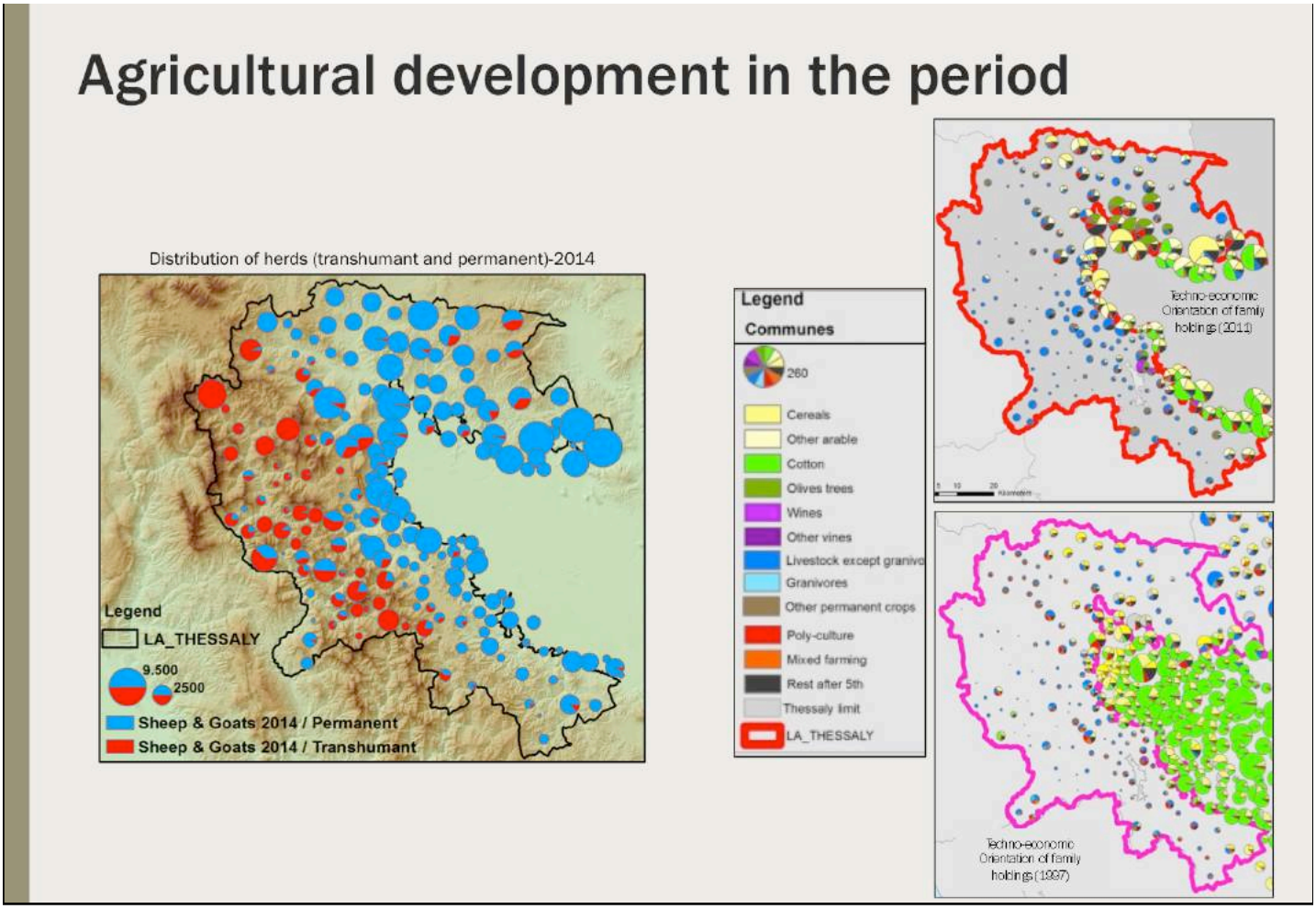
* IZ: Intermediate zone



In the LA, the main productive activity continued to be pastural livestock breeding, transhumance and small-scale low intensity agriculture (cereals, forage, vines, potatoes, legumes and trees). CAP Implementation after 1981 contributed to the stabilization of the rural income through subsidies and thus seems to have decelerated reduction in the number of holdings). In the period 1997-2011, the number of farmers is reduced by 11%. -This decrease was not equally distributed across farms. Taking as a classification criterion the age of the head, a large decrease was observed in the age category of "45-65 year", an increase in the category of ">65 year", and relative stability in the category of "<45 year".

In parallel and especially after the entrance to Eurozone, the Greek market was flooded with agricultural products imports from Europe, Canada, United States and Latin America. For example, beans, which are a national food produced by LA's mountainous areas and are famous for their quality, are pushed aside due to the mass imports, mainly from Canada. The imports of cereals and animal feed by lowland farmers, contribute to the abandonment of the corresponding crops in the LA and the remote agricultural land.

Despite support by the CAP through compensatory payments and other financing tools (Program of Rural Development - PRD), there is no program targeted to support mountainous livestock and agriculture. There are of course compensatory allowances and the infrastructures created by the Integrated Mediterranean Programmes, but there is not an integrated programme (pasture improvement, genetic improvement of breeds, adapted feed etc) with an equivalent effective advisory system. The turn towards higher value products is reinforced after the CAP reform in 2003-2005 (decoupling) and the recognition of feta cheese as a PDO product. Decoupling played a role due to the small size of the holdings, pushing thus towards the search of agricultural products with higher value. This research was also guided by the parallel value that was gradually given to mainly mountainous products starting from wine, honey, cheese products, forest fruits etc. In 2010, the area also obtained the PDO for other dairy products (Kasseri, Manouri, Kefalotyri, Mizithra, Galotyri and Agrafa Graviera cheeses) and PDO wines (Messenikola and Meteora). However, this effort for the recognition of PDO products failed to highlight the ties of mountainous farming systems with their territory, its natural resources and the relevant rich intangible heritage. However, the PDO has failed to effectively function (as a governance



Based on the techno-economic Orientation of family holdings (1997) the main features of development in the LA's farming systems during the same period are the tendency to abandon crops and the orientation of family holdings towards livestock (increase of herd size in sheep/goat farming, creation of new cattle units).

Remaining transhumance livestock covers the traditional semi-nomadic communities of Aspropotamos and all LA's west areas. According to the above map, 333 transhumant herds' distribution in the LA, they seem to cover higher large-pasture areas while the local population, crop production and sheep/goat farming have significantly decreased. A small positive trend is observed in transhumance livestock farming, particularly cattle, due to the increase in feed's cost, as well as the apparently growing demand for products from low intensity farming systems. Feeding expenses per female animal correspond (70.2 euros/female) to less than half of that in intensive farming systems. Productivity is lower but they try to increase it by importing foreign breeds. However, even for local cattle breeds with much lower productivity the demand by the market is increasing offering higher prices that balance this disadvantage, especially when the conservation of such herds is strengthened by the CAP.

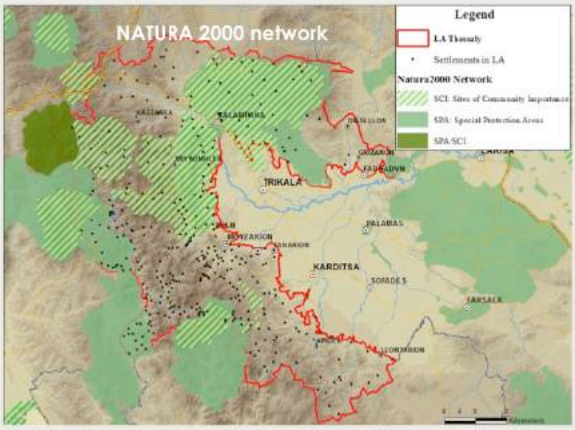
In transhumance the problems identified were:

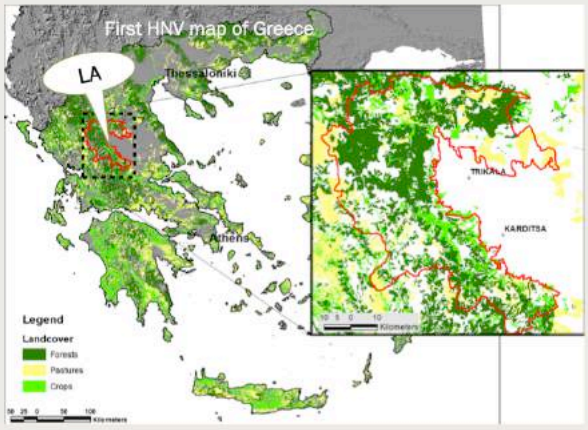
- deficient framework for the designation of land uses, unclear pastures' ownership status and especially mountainous ones,
- competition with transhumant cattle and sheep
- installation of wind farms in areas used by herds,
- lack of an integrated system for the mountainous pastures' grazing management,
- lack of management authorities and environmental management plans in Protected areas, complex legal framework for environmentally sensitive areas, archaeological sites, forest areas.

Consequences on land use and biodiversity

Environnement

1986: the first National law on Environmental Protection (1650/86), EU LIFE programs
1990s: NATURA 2000 network
2000s: First appearance of HNV in Greek RDP HNV acquires more importance, appearance in the public discourse



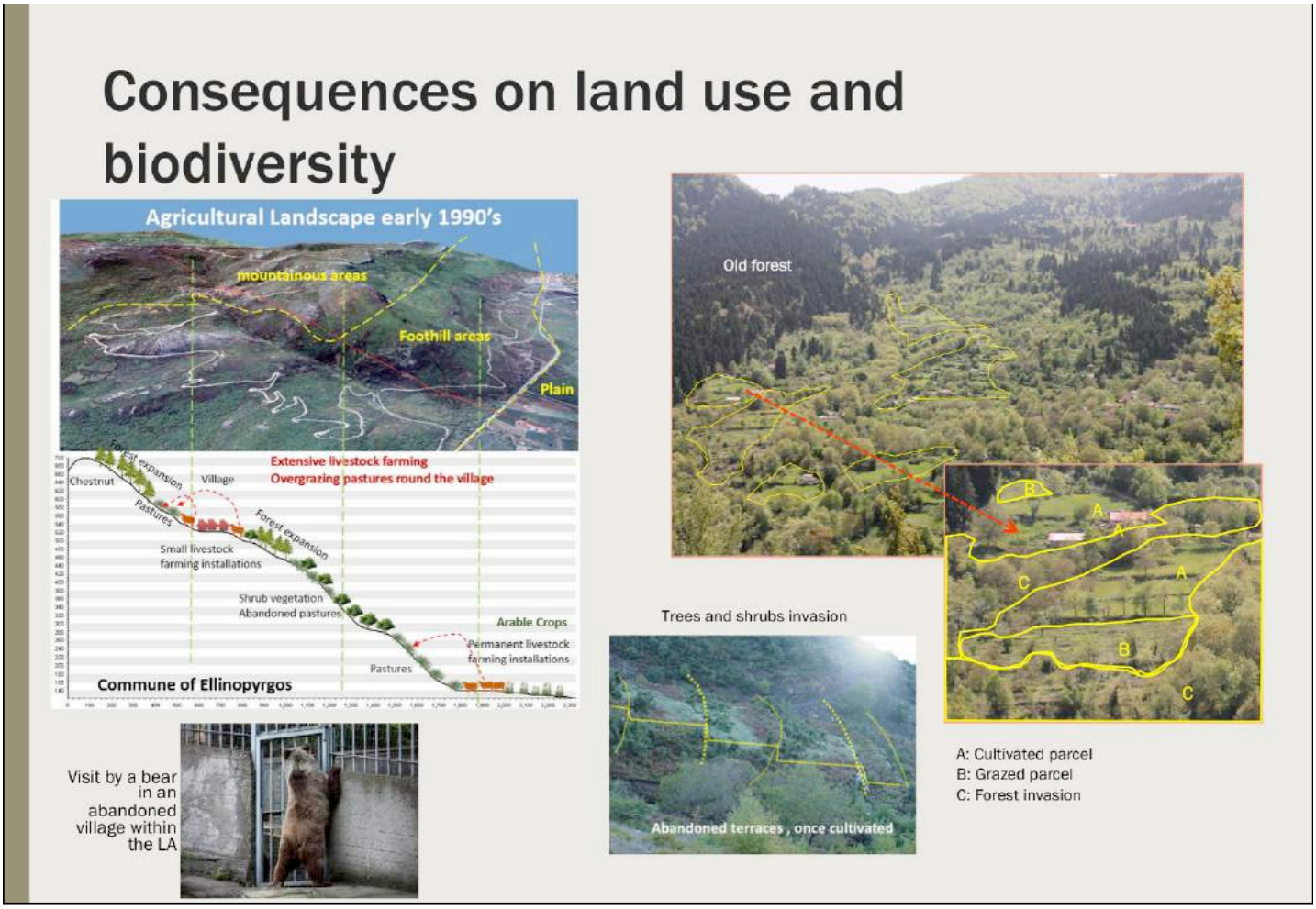


Implementing the European biodiversity protection legislation, protected environmental zones have been established, under the Natura 2000 network, in the LA. However, the implementation of management plans in these areas has progressed only in very few cases in the whole of Greece, leading to rising of conflicts. However, a host of collective actions have been launched to promote and protect the ecosystem *(forest village, botanical garden, environmental centers)* under environmental protection programs.

The main changes in land use management are identified in:

- LA level: agricultural land has nearly been abandoned in the western part and only permanent holdings (livestock, crops) remain in the eastern part. Balanced distribution of transhumant and permanent herds in LA, but overgrazing and abandonment phenomena in state and community remote pastures (high altitude), due to lack of grazing management plans in the scale of agro-ecological unit and community. The exodus at this particular period is still taking place but with less intensity and is linked to the abandonment of remote cultivated land and grazing zones.
- Community level: in the LA's eastern part, grazing and agriculture have been limited to land surrounding the village and nearby pastures that suffer from overgrazing. Small gardens and orchards still remain next to the residences. Highlands previously cultivated in terraces are definitively abandoned. Across the entire LA an accelerating invasion by scrub and trees on the collapsed terrace structure as well as the remote abandoned fields and pastures has been observed.

The progressive fragmentation and disruption of old uninterrupted habitats, due to landscapes change, due to the abandonment of cultivated land and pastures, as well as other interventions (i.e. roads and dams' construction, tourism facilities) was observed. The progress is, nevertheless, controllable,



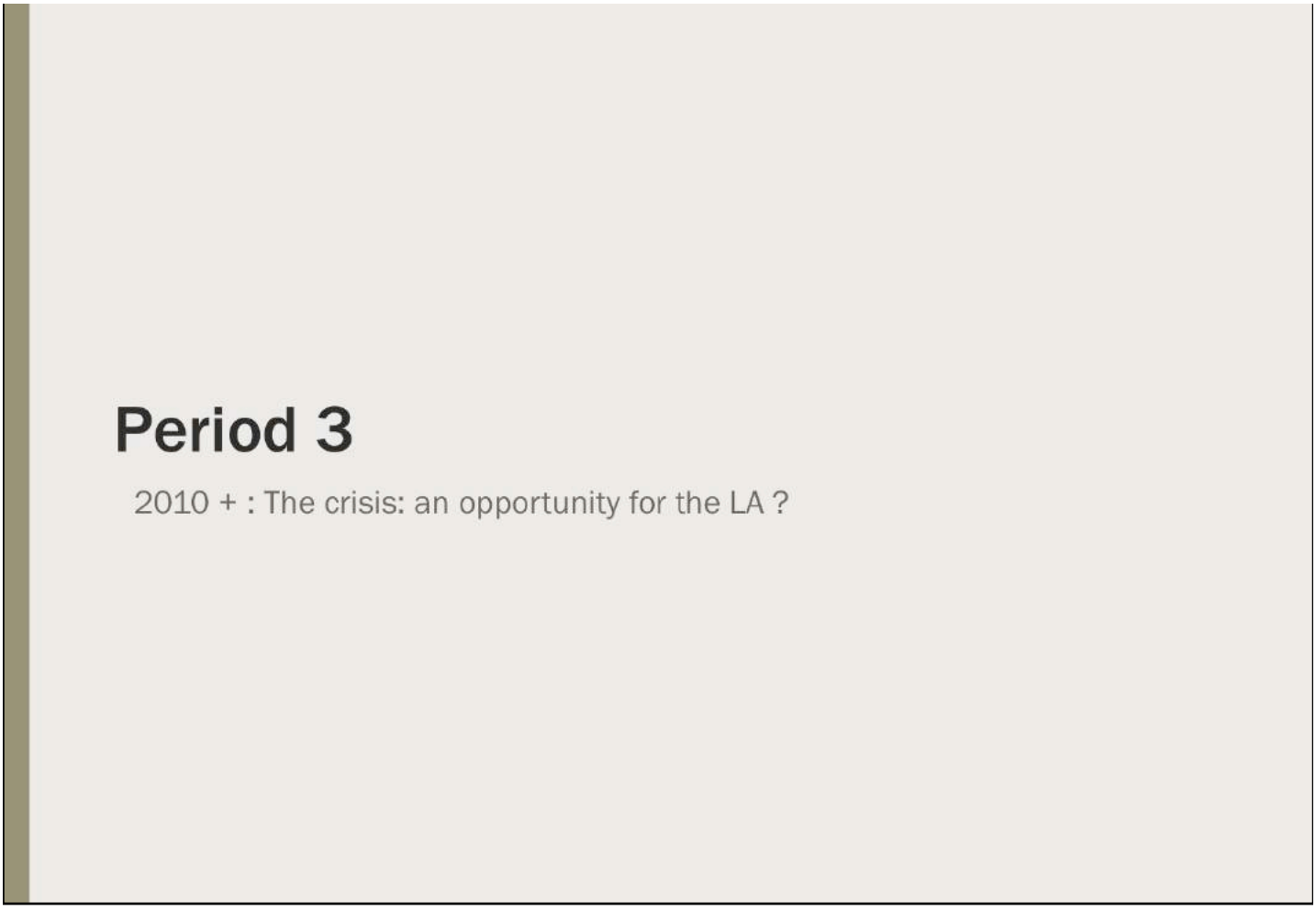
The reduction of pastures, their covering by woody plants and the *densification of enclosed spaces*, degrade biodiversity, and have a permanent negative impact on fauna habitats hence on the conservation of the fauna (permanent/seasonal) and therefore the conservation of the flora and soils' productivity .

The flora continues to deteriorate (Hungarian Oak habitats, herbaceous plant flora, Riparian forests of Oriental Plane Trees (*Platanus orientalis*) and "vegetation's islands" (*Prunus sp*., C*rataegus sp, Rubus sp*, etc.) due to absence of any management scheme and consequently ecological mismanagement e.g. overgrazing caused by uncontrolled grazing.

Fauna: further reduction of populations of rare wild animal species (*Felis silvestris, Ursus arctos* (nearly extinct), *Lutra lutra* and *Canis lupus*) and predatory birds. Populations of small mammals (hare, wild rabbit, porcupine, blind mole, ferret, etc.) which depend, as regards game, on hunting pressure, are in a good state.

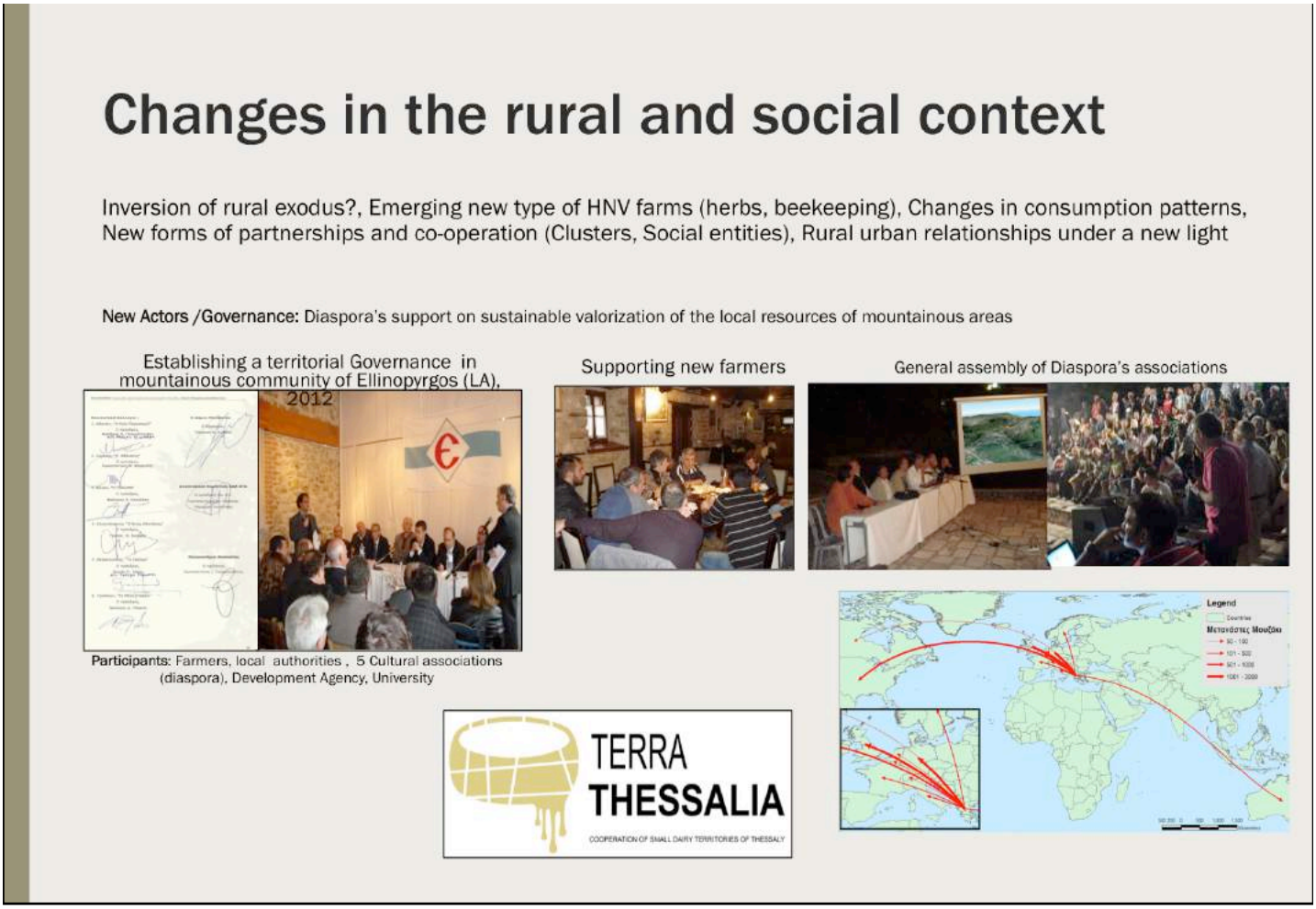
Satisfactory biodiversity state for invertebrates (soil fauna or entomofauna) despite all the pressures from human activity (overexploitation, improvement of streams, road building, creation of lakes etc).

The creation of an actor (Arcturos-NGO) for the protection of the bear resulted in the increase of its population



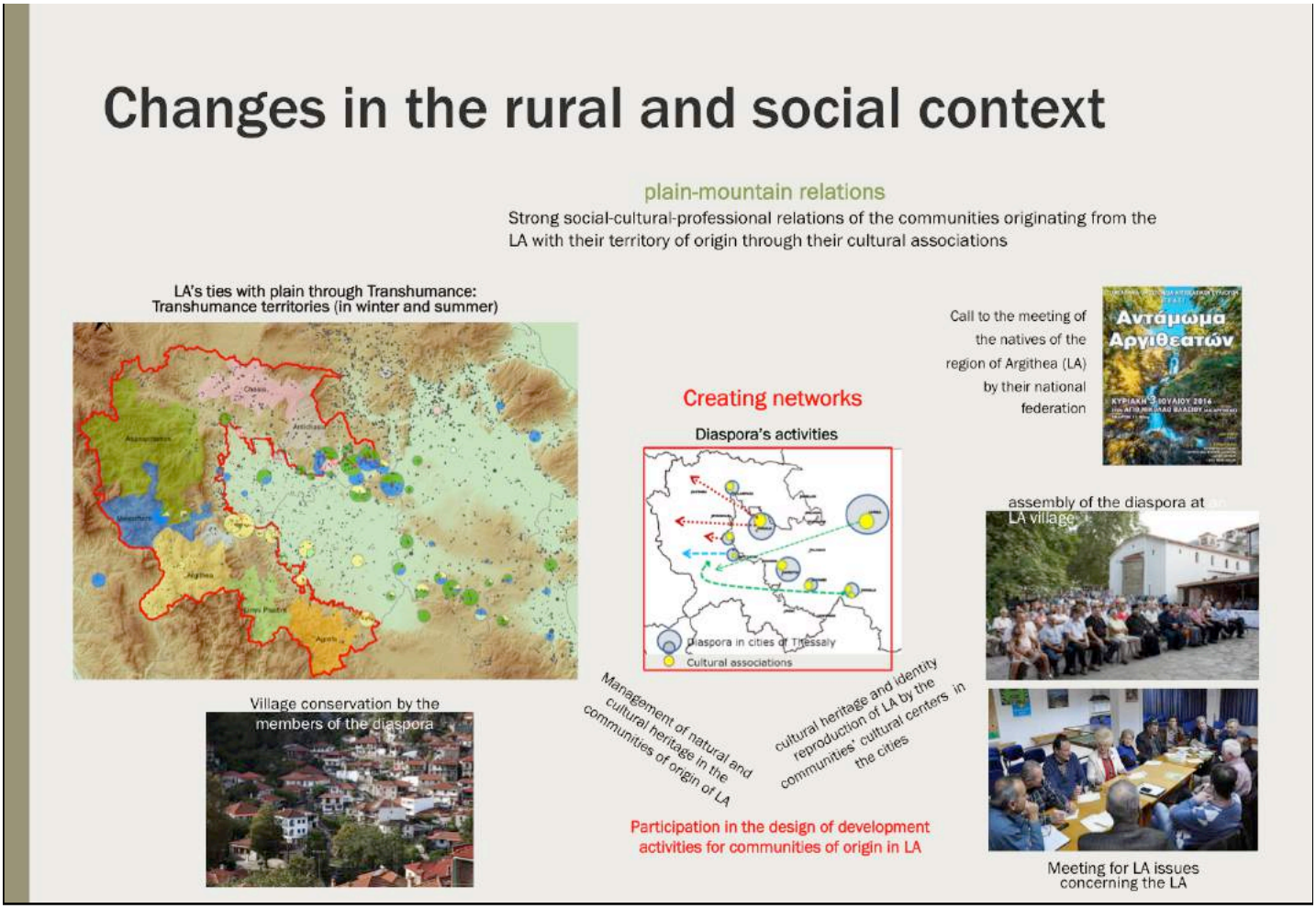
Approaching the crisis as an opportunity for the LA is associated first of all with the changes at the external environment (unemployment at cities, but also a shift towards external markets where demand for local products is more intense) which directly affect the holding (excessive increase of influx and taxation, lack of liquidity etc.). This framework leads firstly to the countryside's emergence as an alternative employment area for city's unemployed originating from the countryside and the LA and secondly to the mobilization of two important institutions: family and Diaspora. LA attracts for the first time after the exodus of its population an important part of its human and social asset in productive actions that take place inside the LA.

The general negative framework of the crisis is presented in the previous slide. It makes sense that the more marginalized part of the country has suffered less consequence compared to more developed areas. What also moderates the impact of the crisis is the funding from the CAP and also an inexplicable turn of Greek consumers towards Greek products. The problem of the higher price of local products seems to mitigate because the consumers are apparently adopting the view "less quantity and better quality". Finally, this effort to focus on local products is searching, with relevant success, for an alternative in foreign markets. In this slide we focus on direct and indirect positive consequences of the crisis (mobilization for partnerships, structural changes in the institutional framework for flexible cooperation forms etc).
As far as the Diaspora is concerned it is certain that its role in the mountainous and island areas is traditionally strong.



The new context shaped for the LA with the appearance of the crisis is defined by: a) the effort to revisit old producers' groups and change of the Law on Cooperatives/Cluster and establish new flexible co-operation forms like Social Co-operative Enterprises (SCEs), b) reinforcing the demand of local products of high quality and c) highlighting the community of origin as a place of residence and employment for some families or young members of the Diaspora's communities. The first censuses after the crisis (2010) show a first stabilization of the exodus and especially the establishment of new/ young farmers. This tendency comes to meet the establishment of pensioners to their communities of origin after 2000.

New initiatives and co-operation forms are being built with the mobilization of research institutes (e.g. University Laboratories), local Development Agencies and other bodies aiming at the mobilization of specific territorial resources. Many of these initiatives incorporate or have as leader the communities of the diaspora, especially when their objectives include protection of the natural and cultural heritage. *E.g. The Terra Thessalia territorial cluster aims mainly to the support of pastoral holdings that preserved their pastoral system*



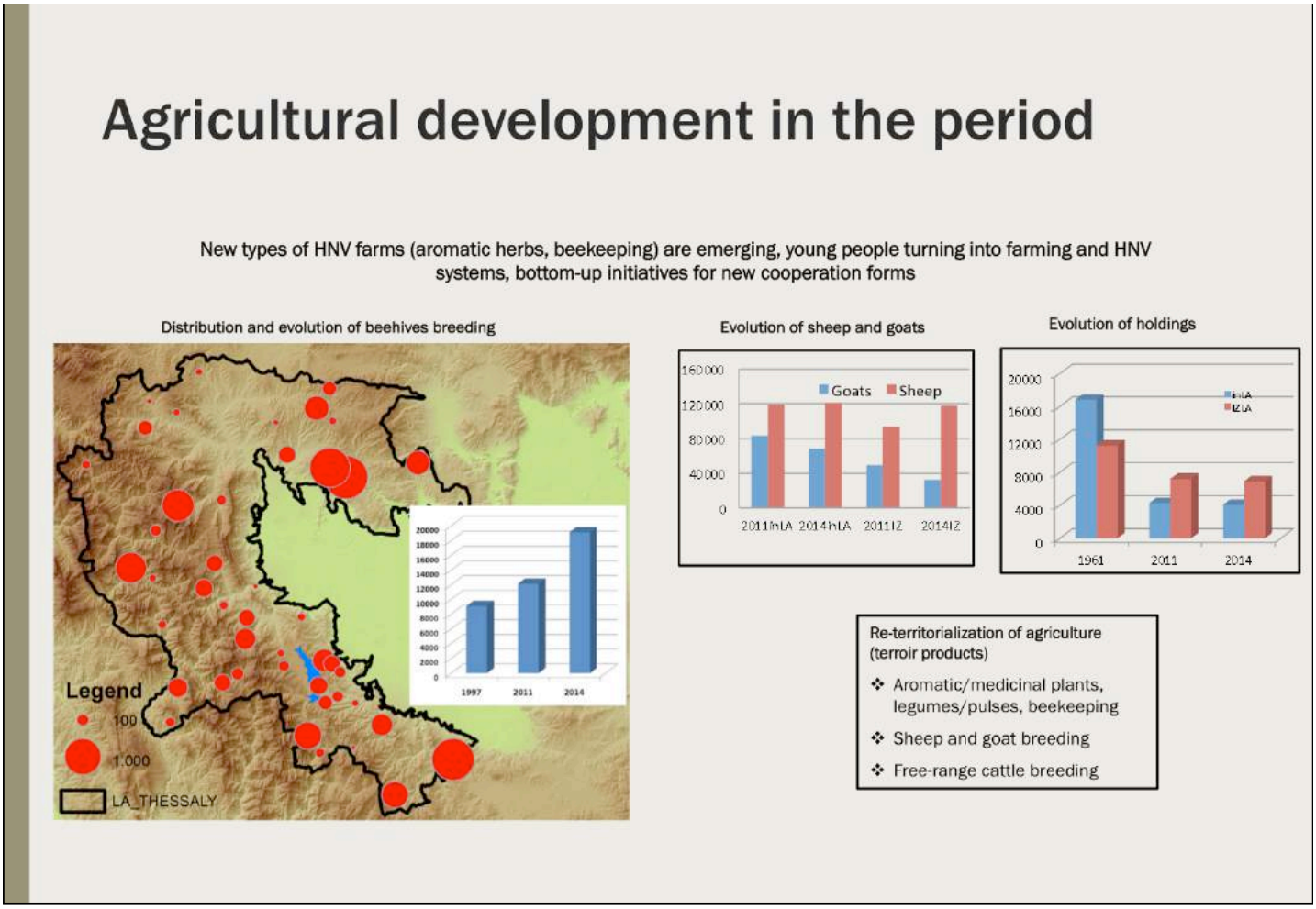
The evolution of the relations between the Diaspora communities and their places of origin were determined in the period 1980-2010 by

- ❖ the apparent intensification of Diaspora's actions to preserve natural and cultural heritage as part of their collective memory,
- ❖ choosing the settlement of origin as a second residence
- ❖ their participation in tourist investments in LA and
- ❖ continuation of close relations between transhumant and livestock breeders (and cheese-makers) permanently installed in the plains since all of them originate from the LA.

Shortly before the crisis (CAP's change in 2003 played a decisive role-decoupling) and more strongly after the eruption of the 2010 crisis, the relations of Diaspora with the community of origin are also expanding in the utilisation of local natural resources and production factors and the valorisation of local agro-food products. This expansion is favored by the fact that natural and cultural heritage are two aspects for whose preservation the Diaspora's associations fought for decades and succeeded in transferring it to 2nd and 3rd generation immigrants. At the same time, both aspects constitute crucial elements of the specificity of the territorial products and services. Migrants, usually better informed than local people, understand and use at the operational level, the higher status heritage enjoys induced by its new linkages with economy (terroir products, identity, practices, know-how etc.) opening thus new options for them in their place of origin.

Those changes lead to the integration of the Diaspora communities as a social network into novel forms of local governance.

Reference is made here to the part of the Diaspora members that lives in Greece and pays frequent visits to the places of origin. The Diaspora that lives abroad is organized, maintains close relations but



Crisis leads to the creation of holdings by new farmers in the communities of origin. This choice is reinforced by smaller dependence of the LA's holdings from influxes, CAP subsidies and demand by the market of mountainous products. The new farmer's installation in the village is favorised by the fact that his family preserved in it, their house and land.

The holding's organization and their effort for adaptation of new crops is decelerated because:

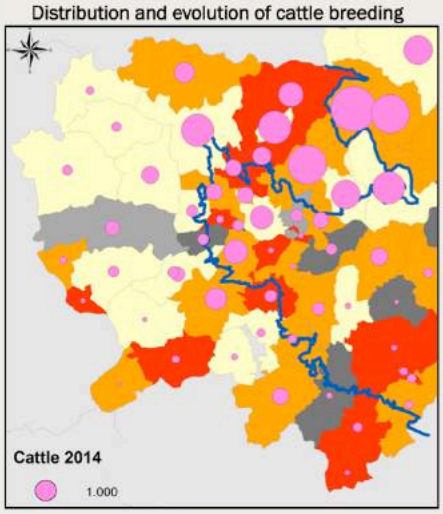
a) the recent decentralization process (2010) has not resulted in an effective cooperation between the departments of the various administrative levels.
b) public administration is rather skeptical towards this new and unexpected installation phenomenon and unprepared to support it
   - licensing procedure by Services like Forestry, Archeological, Electricity supply Authorities, are time consuming,
c) agricultural advices system (public and private) oriented towards the intensive agricultural production model contributes remotely to the support of HNVf systems (terroir, local seeds, etc) and the combination of traditional techniques with new scientific knowledge,
d) lack of cooperative tradition.

These obstacles explain the domination of individual initiatives for crop restructuring. The role of new farmer reception is assumed by the family.

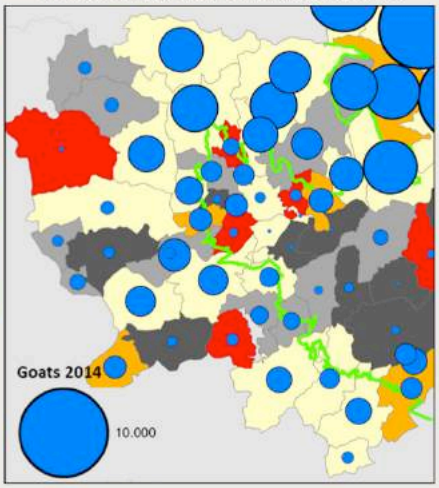
The recognition effort of the products' value by the consumers in spite of the Diaspora's support, meets difficulties because these products concern new markets (short-supply chains, direct sale, etc). Such products are: honey, potatoes, vegetables, aromatic plants, legumes, diaries and meat from sheep, goats and free-range cattle (including livestock holdings of rare breeds). Finally more and more holdings are entering in the 1st processing sector.

Agricultural development in the period

Distribution and evolution of cattle breeding

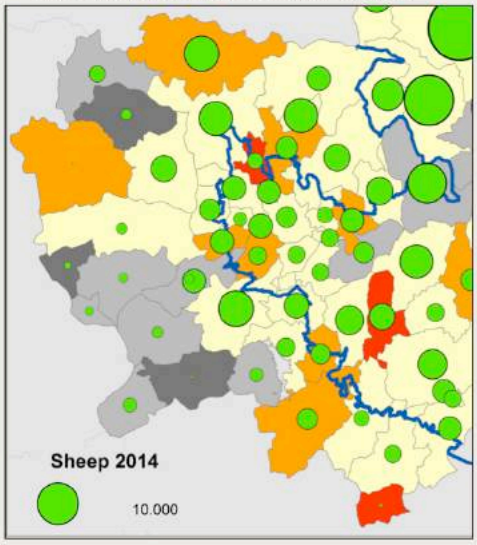


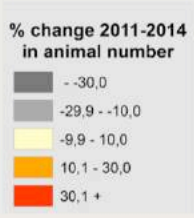
Distribution and evolution of goats breeding



Evolution 2010-2014

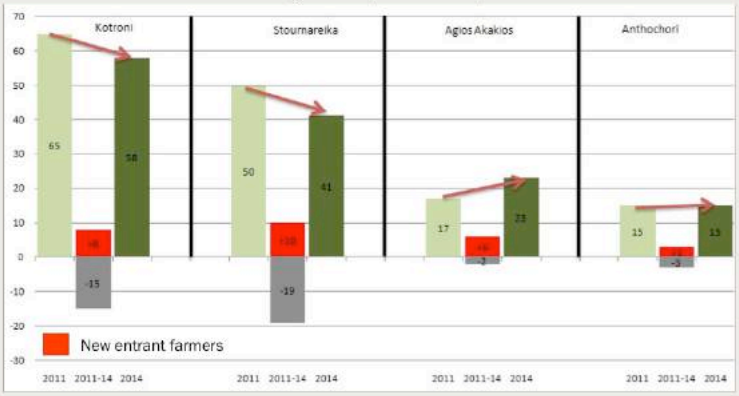
Distribution and evolution of sheep breeding





Agricultural development in the period

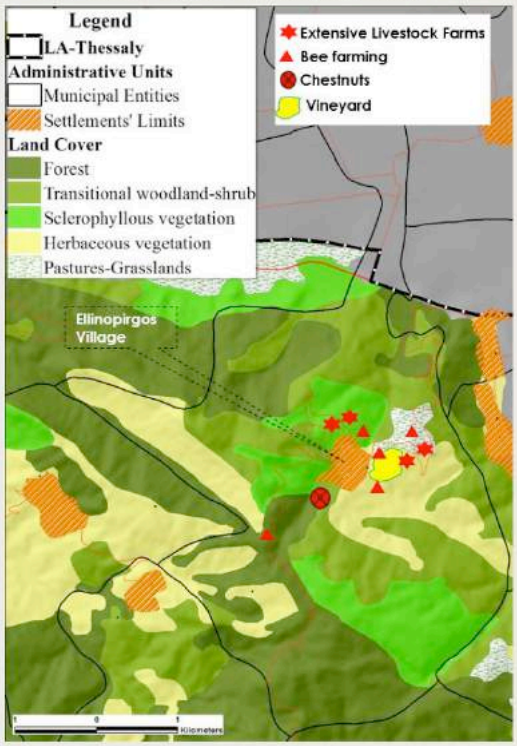
An example of farming holdings and new farmers' evolution in 4 representative villages in LA (2011-2014)



New farmers Installations (2011-2014)

2011-2014	Agios Akakios		Stournarei ka		Kotroni		Anthohori	
	Nb	%	Nb	%	Nb	%	Nb	%
New Installations	6	26	10	23	8	33	3	17
From whom< 45 years old	4	67	2	20	5	62	2	67

Localization of news farms nearby the village

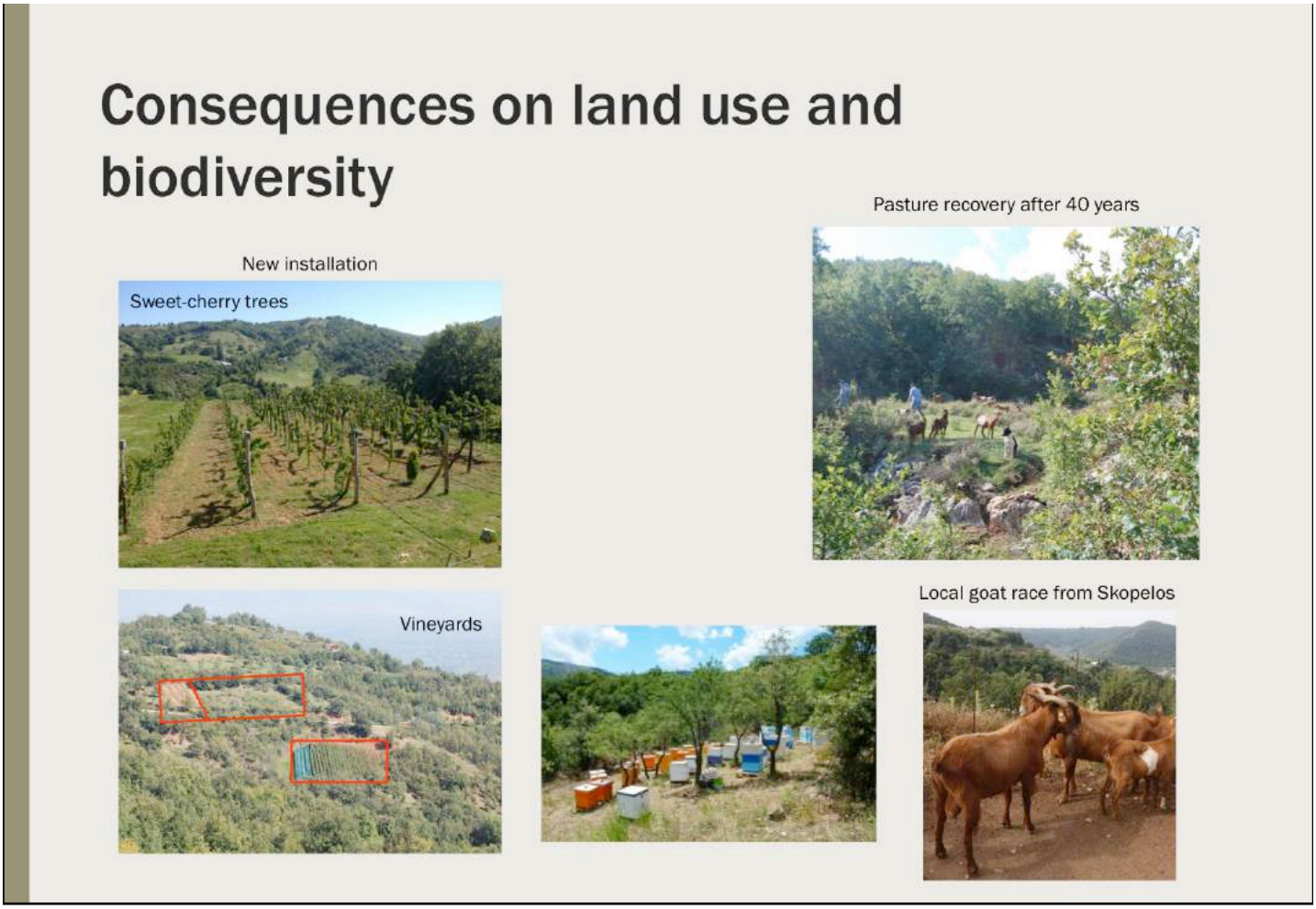


During the 2010-2014 period, return to LA seemed to concern young people (often university graduates) and young pensioners (58 -62 years old), originating from the villages where they finally settled. Those who were not eligible for the measure for "installation of young farmer's" chooses to gradually develop the holding with family support (financial, transfer of Knowledge and know-how).

There are significant qualitative changes of the new head of farms for the first time after 1960 (see above graph). Withdrawals outweigh the number of new entrants, due to the large number of elderly farmers that dominated the community. The results provided by the payment authority (OPEKEPE, 2011 and 2014) show a slight renewal tendency of head of farms (1 exit against 4 entries of young people): the category of <45 years old is reinforced in the villages of east LA located in small-medium distance by the rural towns. This renewal is also found in transhumance. The installation of new agricultural population attributes adds a new symbolic attribute to the return of farmers after 60 years of continuous exodus.

The new holdings are small in size and adopt farming systems well integrated into agrarian structures of the mountainous regions (pastoral farming, polyculture).

The map above presents the locations of the new holdings in Ellinopyrgos, a village with 887 inhabitants and 120 holdings in 1961, was limited in 2011 to about 100 elderly inhabitants and 4 holdings. After 2012 6 new farmers have settled with varying orientations: cattle breeding (1), sheep and goat breeding (1), vineyard (1), vineyard and bee-keeping (1), bee-keeping (1) and chestnut trees (1). The location of their holdings is on average 500 m. from the settlement but within the respective existing land uses (vineyard, pasture).



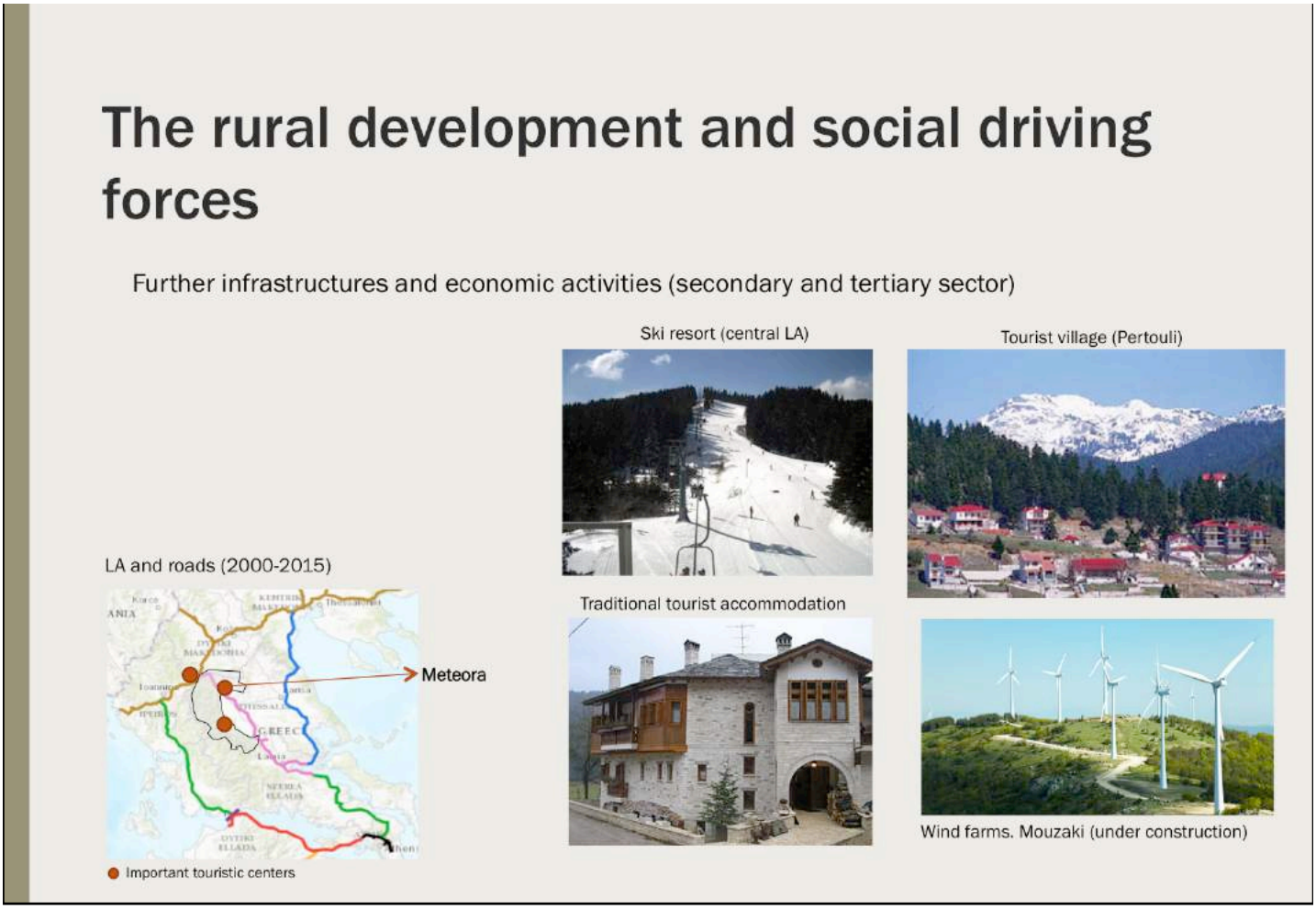
A very important issue has been proved to be managing community's and LA's most remote and abandoned pastures and parcels.
If the installation of new holdings continue following the existing pattern, i.e. mainly near the settlement, this will create a zone intensively used land (close to the settlement and along the rivers). In contrast, the more remote abandoned zone of cultivated land (mostly non irrigable) is chosen for new dynamic crops (vineyards, trees). This is a dynamic reconquest of this zone that requires an integrated management plan (small size infrastructure~~s~~, use of adapted agri-environmental measures). In these zones the parcels are bigger and there is the possibility of transferring water from reservoirs. The reconquest of this zone appears the need for an integrated management plan (small infrastructures, valorization of agro-environmental measures).

The new farmers' installation with pastoral holdings or new dynamic crops, integrated however into the existing traditional agrarian structures, raises the issue of reactivating the local conventions for land use and management of the commons at the level of community boundaries but in the context of new governance forms. That is to say, the revisiting of the management system of commons existing in the community and a new co-ordination with public authorities of all levels.
Reclaiming even a small proportion of arable and grazing land (mountainous agriculture) on the part of small farms bearing HNVf characteristics is the first step of for the reversion of the abandonment of marginal land~~s~~ and desertification, both in human and physical terms, and a significant contribution to an improved management of biodiversity and the landscape~~s~~

The business as usual scenario takes into account two main trends identified within the LA:

- the evolution in the number of holdings obesrved, as a combined result of cessation of agricultural activity, potential succession and installations of new farmers. In 2030, about 45% of head of farm will have stepped down, being over 75 years old. This evolution is determined by the renewal rate through succession (rather small, if we consider that the age of today's several leaders is >70 years old) and new installations. For the 2011-2014 period data give 26% renewal rate of head of farms of which young farmers (<45 years old) represented 47%. However, the question is whether this renewal will continue and at what pace.
- continuation of pastures and crop land reconquest at least for ~~in~~ the most accessible villages. With varying grades of farming intensity from the most intensive use (crops, markets) in land around the settlements to abandonment in the most distant ones Without the introduction and implementation of land use management plans, especially when the installation of new farmers is concerned, there is a risk that the identified trend of forest expansion to pastures, decline of endemic plants and parallel loss of cultivated land and pastures through abandonment, could continue.

Both the above trends, do not address directly the issue of vulnerability/viability of farming household active in HNVf1 and HNVf2 areas. The resilience of these systems highly depends on the existence and effectiveness of policy measures focused on the support on HNVf systems. Without such measures the evolution in the LA will be determined by reinforced current trends: pastoral herds' spread without plan, with a parallel reduction of their number, especially of the small ones and enlargement of the herd size for the remaining ones.



Tourist development of areas and settlements with good access was based on the combination of Leader και Pider programs, Diaspora's businessmen and 2 local development agencies (Ltd companies with the participation of both local administration and social sector actors) active in the LA. In the rest of the villages, tourist development was limited to the arrival, during summer, of the Diaspora members and the creation of small community or private hostels. Progress would hardly, extend beyond the already developed villages and micro-areas: for those, growth of tourist infrastructures and activities was based on investments that have already taken place, resulting to increased tourist use of the landscape and other natural resources (rivers, trails, demonstration fields etc.). In addition, LA will be the inland of visitors of the established nearby tourist destinations of Plastiras lake, Meteora (1,500,000 visitors per year) and Metsovo would gradually discover.

Based on current trend one could suggest a probable increase of in farm processing units. However, if no new co-operation forms and small value chains are formed, it would be difficult to overcome the impersonal small distribution networks. Finally, increase on bottled water consumption in urban centers, due to the degradation of the water resources in the plain's favors the further valorization of water resources within the LA.

The collectivities of The Diaspora, mainly cultural and environmental associations as well as women's cooperatives, remain the main social force, while new farmers and businessmen who either settle or expand their business activities in LA should be considered an important emerging social group. The territorial equity dimension of development will depend on the ability of cultural associations and the new forms of social economy to contribute more actively to the utilisation and valorisation emergence of local specific resources.

Agricultural economy is based on large pastoral herds and agricultural holdings that will continue focusing towards dynamic local crops with a relatively younger albeit reduced population. They receive the largest subsidies while 64% of holdings (with economic size <8.000€) receive less than 2,000 euros of subsidies each.

Processing businesses- retail chains based in the plains, will continue to hold disproportional market power and offer them the same prices as the ones enjoyed by intensive producers of the plains (milk and meat production) as long as the quality characteristics of the products and the HNV character of mountainous farming systems are not highlighted and/or guaranteed. On the other hand, the possibility of on farm first processing and trading, is limited by compulsory milk pasteurization. (Responded to transparency No31)

Further obstacles in the effort to increase the added value of products and services:

- The inexistent willingness of holdings to co-operate, affects negatively the proportion of their produce traded in the existing short supply chains consisting mainly of local and supra-local social networks of household (Diaspora, visitors, consumers' cooperatives). The same problem, lack of co-operative spirit, act as a constraint for the exploitation of two other marketing channels with increased interest on quality and identity products, namely supermarket chain and specialty food shops. Cooperation forms like women's cooperative and/or Social Cooperative Enterprise could have better prospects due to *their* flexible institutional framework.
- Developing Cluster-type cooperation forms, supports the organization of small artisanal units, valorisation and promotion of products produced by HNVf systems. However, preserving or increasing the holdings for which the cluster could guarantee the HNV character depends also largely on the general policy and organized intervention for their support. Therefore, the implementation degree of this policy defines the development limits of the cluster for the next years.
- The contribution of tourism to the local agricultural economy is limited to being the outlet of certain agricultural products and the development of *demonstration fields***,** due to the rigid regulatory framework *food safety* for selling local products (milk, meat).

Nevertheless, the contribution of Cooperative Banks (especially during the crisis) and Development Agencies in supporting micro-investment plans and utilizing the various European and national policy instruments and measures should not be left unnoticed. Due to statutory principles and the fact that are local bodies, both these two organizations support small plans with environmental sensitivities, oriented towards local products and agri-tourism

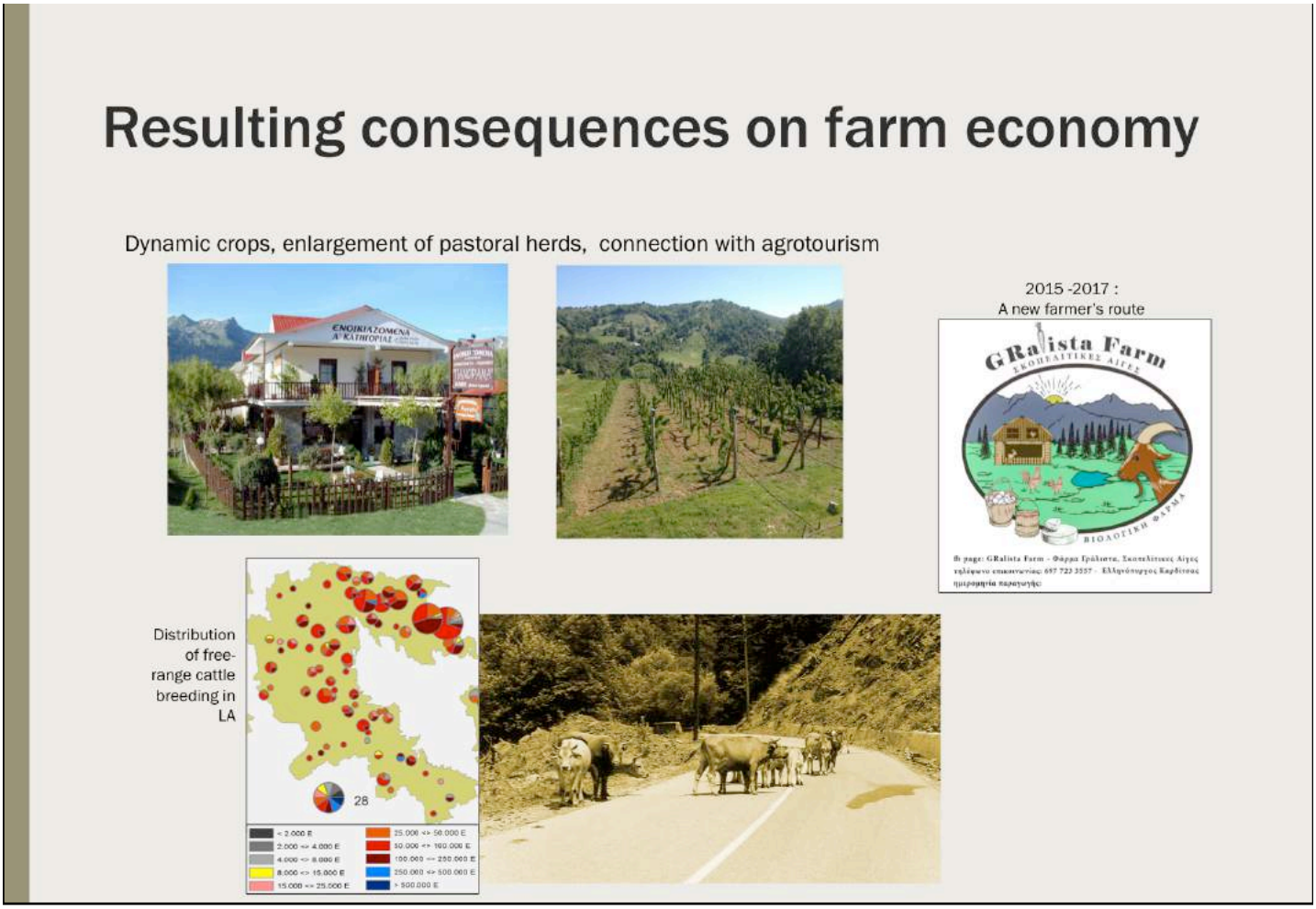
Key policies for the LA are the CAP, PRD (Rural Development Program), National Strategic Reference Framework, European programs like LIFE, Interreg and also programs from Foundations that are active in the field of consulting and technical support for new farmers. Great possibilities of positive synergies exist between Community Led Local Development (CLLD) (horizontal interventions) at the level of the LA's micro-regions and ITI (integrated territorial interventions) in the entire LA and its adjacent areas.

RDP measures are designed in national level with almost the same criteria and are applied in the scale of exploitation (improvement plans, agri-environmental etc.) and the limits of problematic areas due to the effects of intensive agriculture (nitrate pollution). The policy of coupled payments focuses on products important for some sectors (cotton or forage and milk for livestock). In spite the fact that RDP has such measures those have not yet been activated. Therefore, it is predicted that in the scale of municipalities and community it will be difficult to overcome the obstacles for interventions focused in the level of community, agro-ecological zone, terroir aiming at managing HNVf systems and better integration of the farm unit.

The above framework and particularly the measures of RDP (Agricultural Advisory System, Quality Assurance Schemes, Farm Improvement Plans, Installation of young farmers, Processing, Pluriactive holdings, Areas with natural constraints, Agro-environmental measures, organic farming, NATURA 2000 payments, Producer Groups, Short supply chains and local markets, co-operation) provide opportunities for integrated and focused interventions but their exploitation will heavily depend on the existence of management plans within every community and the efficiency of multi-level co-ordination forms (governance). This co-ordination form will overcome the issue of liquidity through a combination of funding that includes the Municipalities' own participation, the exploitation of financial instruments like NSRF, ITI, RDP, LEADER etc.

The basic institutions that can contribute towards this direction are:

- The new co-operatives and the, under construction inter-branch organisation for feta cheese,
- The Municipalities of Pindus (LA) through their collaboration for the sustainable development LA's and reconstruction of local productive systems but also through their initiative for the creation of a Support Center for the HNV farming systems,
- All the elected members of the Parliament and other elected dignitaries originating from the LA,
- LA's cultural and environmental associations, World Federation of Thessaly Associations,
- Terra Thessalia Cluster: a pilot collaboration of all the actors involved in the upstream and downstream of the dairy chain of pastoral livestock products.



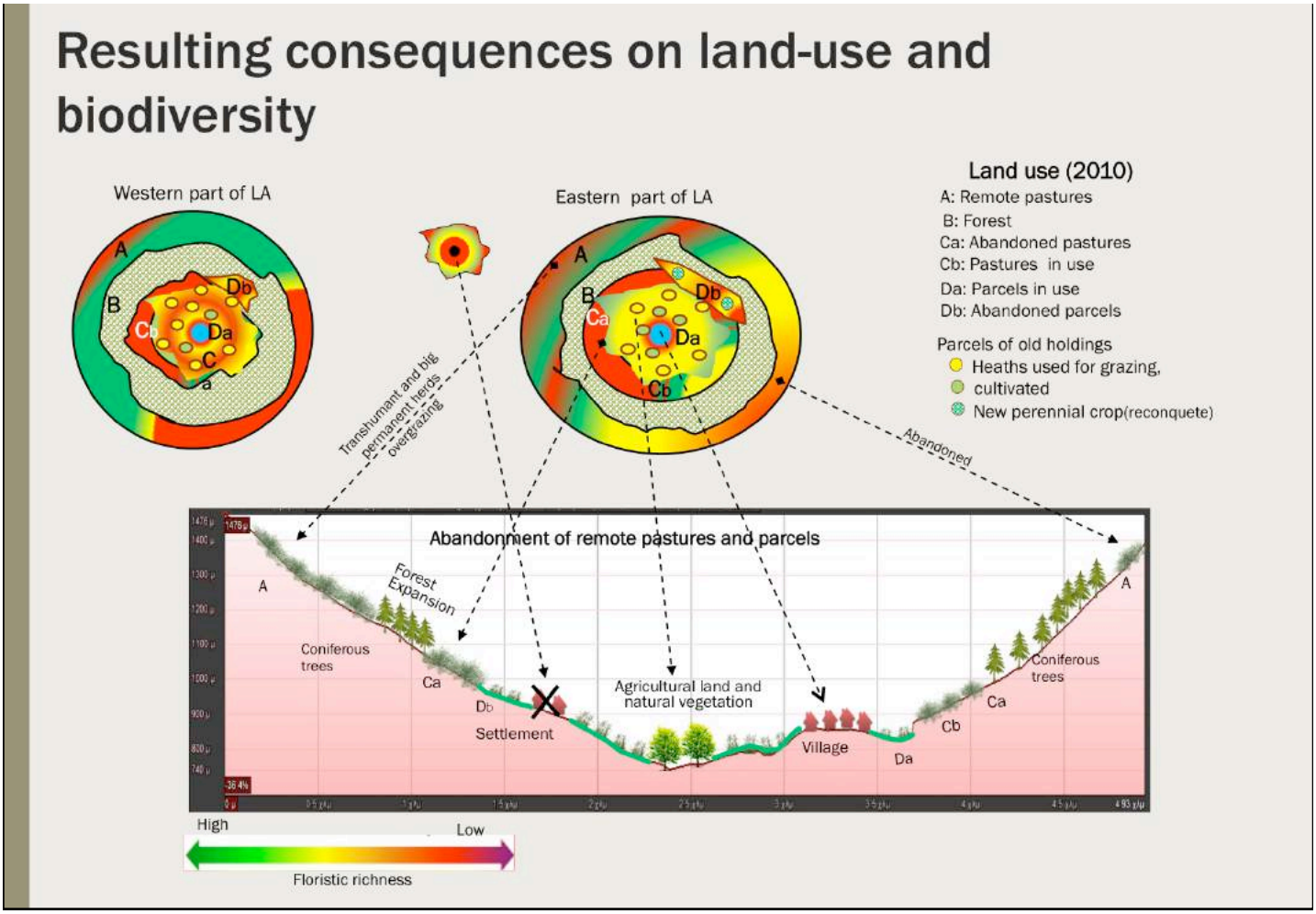
While demand on LA's products is strengthened due to the "mountaininess" and HNV character of existing local farming systems, the producers continue being subject to the difficult, sometimes harsh, working conditions of those systems without benefiting from this trend in the form of a e.g. price premium and/or improved access to markets). Farmers under 45 years old constitute a remarkable force in the area,~~,~~ representing 31.5% of the total.~~-~~Their mobilization especially in the specific context shaped by implementation of CAP and RDP in Greece, could pursue any of the following alternative development paths:

a) pastoral sheep and goat breeding due to access to Thessaly's dairy industries controlled by businessmen who come from the LA but also subsidies and the reduced feeding cost allowed by grazing. Within this path, low yields of extensive farming due to non-rational management (reproduction, feeding, living) of the herds combined with the difficulties of increasing the added value of the produce, push the producers towards enlarging the size of herds.

b) free-range cattle breeding to a lesser extent. It responds to existing demand (since Greece has a deficit in bovine meat), offers better working conditions~~,~~ and is favored by high subsidies. In both cases above, the lack of easily accessible slaughterhouses and cheese-making with mandatory pasteurization, pose serious barriers to the profitable marketing of the products~~–~~not only in the conventional market channels but also in the local tourist market, as well as the market created by the Diaspora.

c) products of recognized value and increased demand (honey, vegetables, fruits, chestnuts, aromatic and medicinal plants) especially by new farmers. There could be a tendency to concentrate parcels and intensify agricultural practices around the village and in the, under-reconquest abandoned and remote agricultural land. It could also cause increased and infrastructure irrigation needs. This dynamic might have negative environmental consequences in the absence of a planned environmental and territorial integration of individual farms in the farming system.

d) preservation of the pluriactivity, with short term (weekend) tourist accommodation and entertainment services. This could also led to a reinforcement of the tendency to integrate pastoral holdings as demonstration fields in tourism development zones.



The expected abandonment of livestock breeding and agricultural land by the large number of mainly small holdings with aged leaders (45%) irrespectively of the renewal degree, resulting in the elimination of small herds, will cause changes in the organization of the grazing system in the zone around the settlement. Parallel, the growth tendency of the permanent and transhumant herds will be strengthened. The choice of less remote pastures based on clearly spatial criteria (distance, infrastructures etc.) would continue. Small trend of land concentration and intensification of practices, resulting in the loss of fertile soil. New perennial crops extension in the old remote farmland zone.

Negative consequences

- Expansion and dominance of forest ecosystems in the unused pastures,
- Continuation of the densification and increase of the vegetation height of sclerophyllous vegetation- (asphodels, thorny shrubs, phrygana, etc.) in the abandoned agricultural land due to management,
- Increase of the uncontrolled collection of wild herbs (mountain tea, oregano, Saint John's Wort) and edible flora (chicory, dandelion, etc.) in the grassland ecosystems (grasses, wildflowers), resulting to the decrease of the intrinsic biodiversity
- densification of soft rural tourism, wind power facilities and small hydroelectric dams,
- increased environmental risks (fires) due to the reduction of the landscapes' heterogeneity

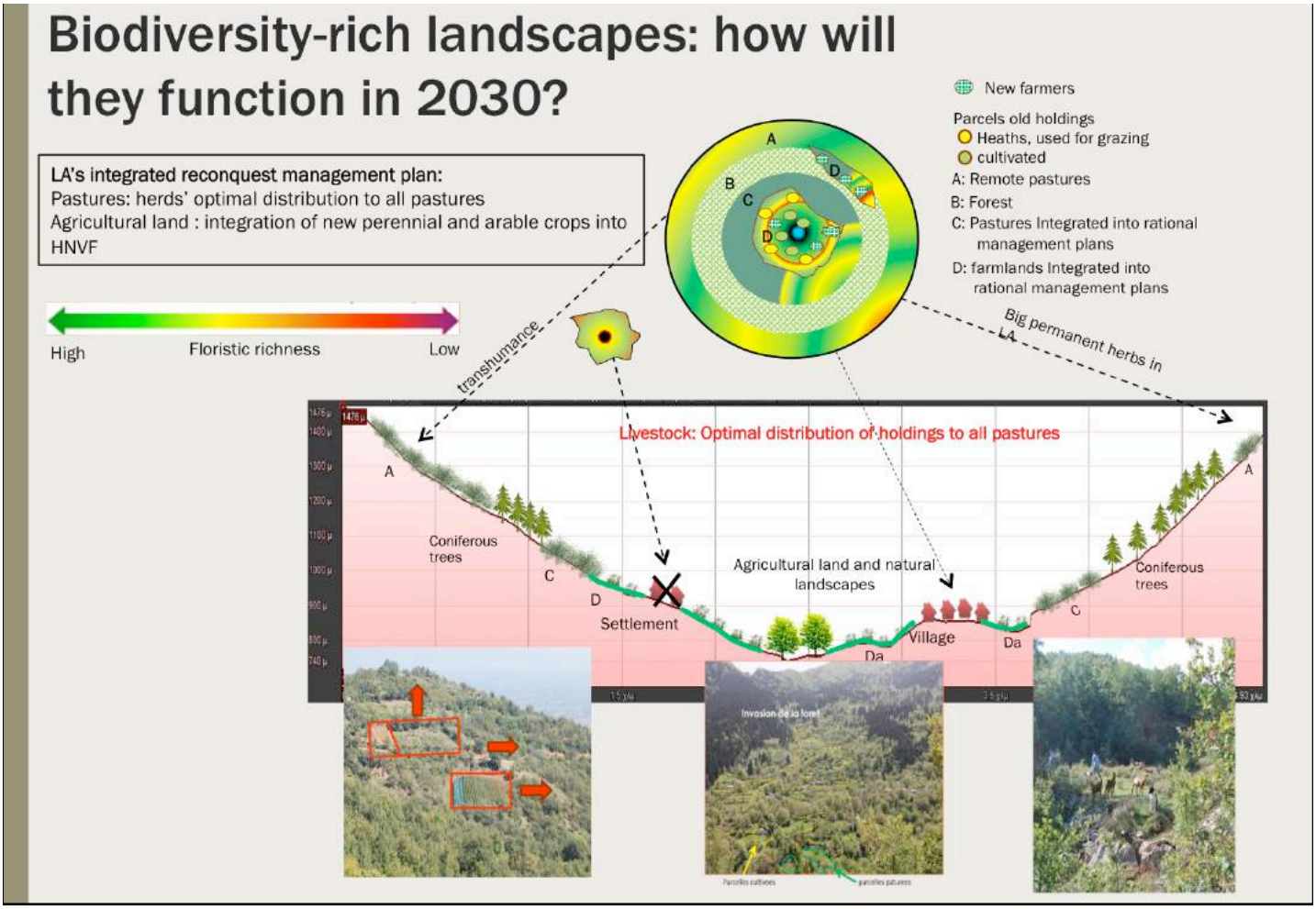
Positive consequences

- reconquest of closed pastures and abandoned agricultural land by new or old holdings (sheep and goat breeding, cattle, specialized perennial crops) due to the valorization of the HNVf systems and their products,
- interventions (scattered however) in the framework of implementing agri-environmental measures,
- preservation on the population of the species *Canis lupus, Felis silvestris* and birds of prey like: *Buteo buteo, Falcon naumanni* especially in Natura 2000 areas due to existing protection schemes,
- due to the maintenance of vegetation islands, there could be ~~is~~ an increase in: the fauna of small preys (birds, hare), certain reptiles (snakes)- as beneficial crop regulators, insect fauna (pollinators) and the beekeeping' productivity.

The vision reflects the need to incorporate the HNV dimension into the evolving procedure of LA's re-conquest process within the wider context. A dynamic conjuncture framed, on one hand, by the need to integrate ~~the~~ environment protection and ~~the~~ quality of life as objectives in the development process, a demand that is consolidated more and more also among consumers and, on the other hand, by the socio-economic conditions of the crisis. This objective is achievable because during the last decades, the reclaiming process, shifted from the approach of strict conservation and exclusion ("land spare") to another approach, supported by the Diasporas communities, where natural and cultural heritage management and ~~its~~ speciality production (eg. cheese-making) are integrated in a project that instead of excluding tourism, involve it as an essential part of the vision. The installation of a new farmers' body opens a new chapter for the productive exploitation of the area's significant resources: rich environmental value, big pastoral tradition and holdings that belong to the HNVf1 and HNVf2 category. In that process pastures' and their rich biodiversity and landscapes are the main assets.

A plan for the implementation of the vision is based on the utilization of the multi-partner scheme of the LA's social, economic and political actors and institutions (HNVf producers, diaspora, consumers etc.) from the public, private and social sector. Incorporating those partners in a horizontal governance scheme, attempts their coordination, by assimilating different ways of participation at the various policies (RDP, LEADER etc.) which are an important tool for promoting LA's sustainable reconquest. Such a governance scheme can better deal with issues such as native relations, the rising representation of the regionthe combination of informal and formal institutional relations and knowledge.

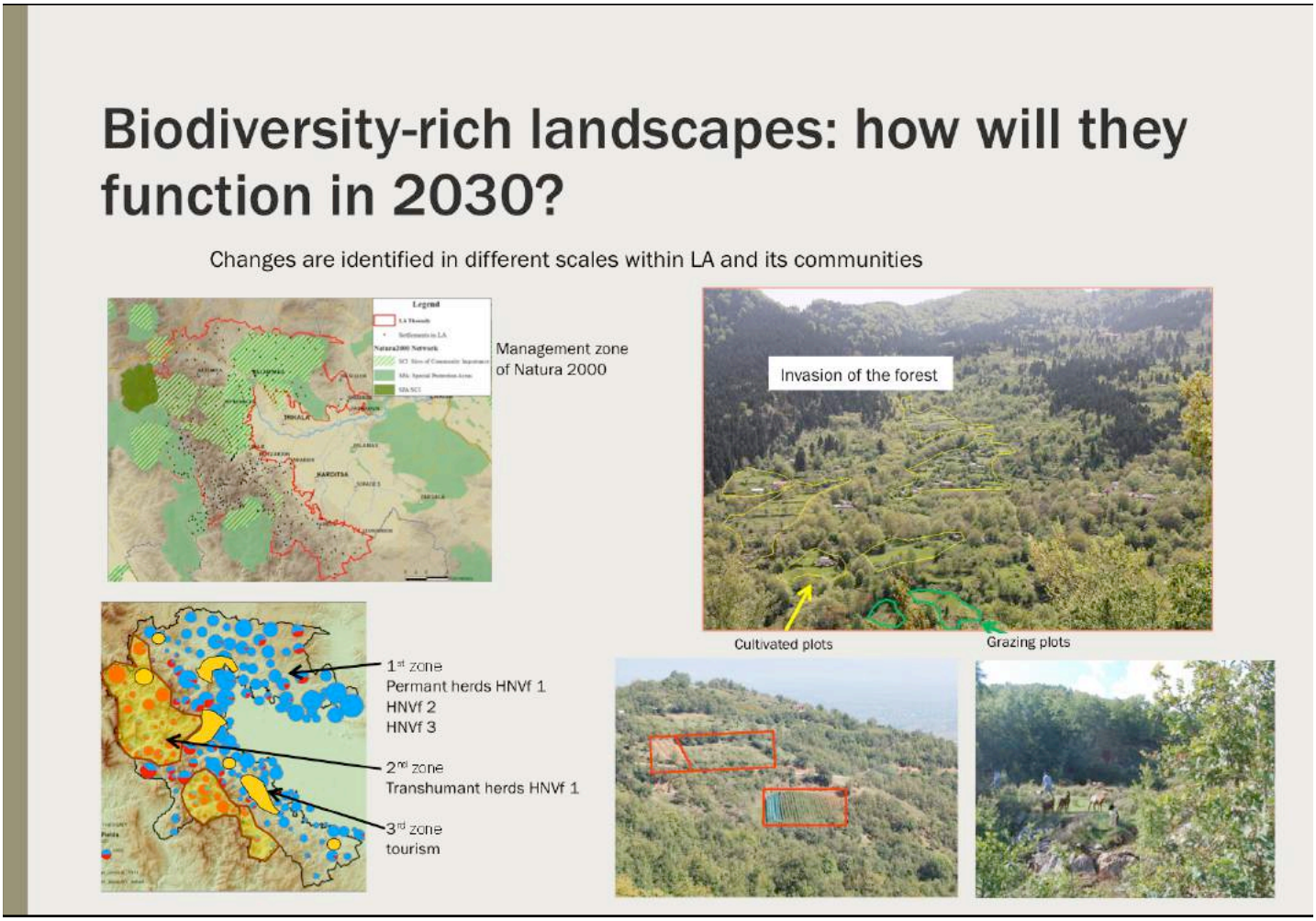
In this cooperation and coordination context, planning an integrated intervention is required to effectively manage the pressures and impacts on LA's landscapes and biodiversity as well as the prevention of intensification and/or abandonment of farming. The proposed governance scheme and management plan, are called to highlight the way in which it is possible to overcome public intervention deficiencies e.g. policy failures. But also to support the multifunctional role of LA's HNVf systems, the scale of every community and biodiversity landscape



Landscapes' function for the preservation of biodiversity within the LA is ensured with the preservation of the HNVF and hence, the traditional structures of the landscape itself. The combination of the various RDP measures can enhance the synergy between support actions of the HNVF systems and actions for the preservation of spatial heterogeneity and thus the structural connectivity of the landscape in favor of biodiversity.

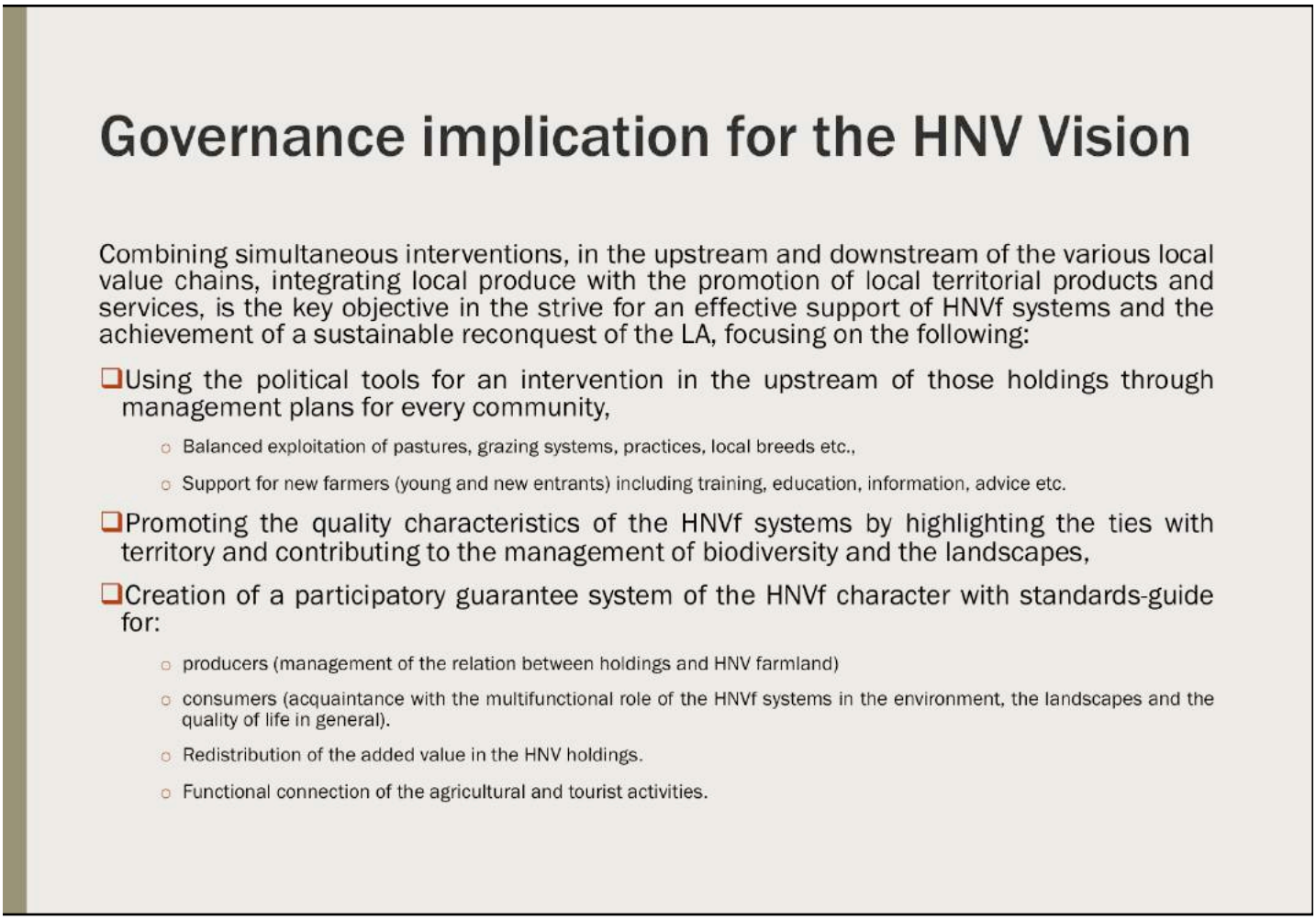
Planning for the sustainable reconquest of Pindus contributes towards this direction. It adapts to the local circumstances by adopting a specific management plan that is being developed in every community under the auspices of the Municipality. The choice of the community, as the optimal intervention level beyond the symbolic dimension, takes into account the complex situation formed within the agro-sylvo-pastoral system by the property rights which involve the state, the municipality, individuals settled and transhumant, as well as the absentee owners.

The management plan is the main co-ordination tool, in the level of the community, of the relationships between HNVF land, the farm unit and the wider landscape. The main objective of the plan is a more balanced and better distributed reconquest, integrating all grazing lands and new farmers' crops and perennial crops at HNVF 2.



The Management plan combines interventions in two levels: a) the level of HNVf land, the wider landscape and raising awareness though actions funded by the various agri-environmental measures (e.g. RDP measure 7.6), b) the farm unit, the zones of agricultural land (HNVF land) and the pastures located in shorter or longer distance from the village with objectives and actions within a framework of specifications that delineate the producers and other stakeholders' activity field. These specifications are enriched and used by the participatory guarantee system for the promotion of the region's HNV farming image.

Pastures: improvement of pasture's productivity, limitation of non-grazing species (e.g. asphodel), management of pasture carrying capacity and stocking rate: distribution of the herds, selection of installation place and grazing plan for the new herds in order to protect herbaceous flora and prevent the expansion of forest vegetation~~'s~~,
Cultivated land: a) respecting the structures of HNVF land (preservation of hedges) and also vegetation islets, and b) good practices, rational land management etc. at the level of farm unit and the land parcel. Improvement of the flora and reinforcement of invertebrate biodiversity within arable land,
Managing those units as elements of the structure of a heterogeneous landscape and not as production units contributes to the reduction of the habitats' fragmentation and the gradual deceleration of the trend towards a loss of biodiversity. The preservation of hedges, vegetation islets, the protection of streams and riparian vegetation but also the proper distribution of the herds and good practices in agriculture, contribute to the high quality of the natural-agricultural landscape.
Other uses
Restoring the heterogeneity of landscapes and a better organization of grazing contribute to a significant reduction of fire risk. At the same time, any investment in access micro-infrastructures (e.g. new cultivations in the old abandoned agricultural land) facilitates the development of sustainable rural tourism activities since visitors are attracted by the quality landscape.



All the involved actors participate in the governance scheme and use of the HNVf Land and it is managed by a local committee.

Producers: together with the farm unit they are an active element of landscapes' structure and function. They are supported by an information system for the preservation of biodiversity, the positive impact in agricultural systems' productivity. They are actively involved in the implementation of innovations that contribute to biodiversity's preservation and are familiar with the use of new technological tools.

Diaspora: participation in the management of their parcels, the gardens/orchards as well as ~~and~~ the houses within the settlement

Public bodies (local, regional and national level) are involved in the HNV management on the basis of recognizing the Community as a basic organization and operation unit for the co-ordination of the relationships between HNVF land, the farm unit and the wider landscape within the framework of a management plan.

A new governance form in the scale of the LA can oversee the implementation and update of management plans and their assimilation by incorporating representatives of the local community committees.

The mood for co-operation between the various bodies that have different objectives is based on the existence of a common topic that concerns the preservation of natural and cultural heritage of the landscapes:

- for the producers: it is to strengthen the image of local products in which the new farmers invest
- for the Diaspora: it is the preservation of these landscapes for which they fight through material and immaterial interventions
- for the public bodies: they are more and more obliged to activate and implement various measures of the RDP that concern the conservation of biodiversity and the promotion of quality products/services
- and finally for everyone: the risk of the various zones being characterized as wooded land, due to the continuous expansion of the forest

Managing an HNV area is an issue, not only for the (rural development, agricultural, regional, environmental ..) policy makers, NGOs, but mainly for all those who live in it, use the natural resources or have been assigned with their management. Therefore, it is necessary to plan an integrated intervention effort in order to include all the individuals and bodies who are directly or indirectly linked to the management of an agricultural system, its farmland and semi-natural areas.

The support of the HNV production systems, in order to be effective, should not be limited in the level of the farm units that adopt them. It should also extend to the integration of these holdings at the plan to valorise the products of and services provided by HNV systems, through new cooperation forms in order to reach out consumers.

Certain elements could be thought as essential for the success of such an integrated intervention:

- Guidelines for the organization and operation of every holding in the limits of the community and the agri-ecological unity in which it belongs,
- Establishment of a participatory guarantee systems' with twofold purpose: a) internally monitoring the implementation of the guidelines by individual farms and b) provide reliable information to consumers on the links of local products and services with the HNV systems which contribute to a sustainable use of natural resources, biodiversity conservation and landscape quality–
- Creation at the LA level of a governance scheme to manage, monitor, evaluate and improve the above and co-ordinate agro-ecological actions and interventions.

The obstacles that appear are the following:

Social and Institutional

- Decline of the traditional management forms of the commons (pastures, water) and deficient mitigation of this gap by public administration
- Deficit in raising awareness on the importance of biodiversity in terms of environmental sustainability, system's productivity and potential effects of synergy
- Deterioration or complete absence of cooperation forms (associations, cooperatives)
- Lack of advice, advisors and an effective extension service
- Difficulties for the establishment of an effective rural governance scheme due to continuous administrative reforms (rendering the consultation process ineffective)
- Lack of interaction between indigenous knowledge and modern scientific research

Specific policy issues

- *Food safety regulation*: The cheese production technique traditional used does not include milk pasteurization, hence its nature as a mandatory prerequisite, turns the marketing of the traditionally produced cheese to an illegal activity.
- *Land use*: The lack of Land Registry (Cadastre) makes the delineation precise boundaries' between forest and pastures, impossible
- *Biodiversity conservation*: Delay in the establishment of environmental management plans in most Natura 2000 protected areas. Absence or non-effective participation of producers in the initial designation process and also in management and planning procedures of this areas
- *RDP*: Lack of specific measures to support HNV farming and farmers in the current policy framework

Markets and product innovations

- Difficulty in accessing το loans and financing, especially for small holdings
- difficulties with in networking, especially in access to trading networks, due to lack of co-operation in processing, guaranteeing an adequate quantity in order to enter the market and difficulties in the effective

Who are the actors to get involved in the process? How?

Meeting under the HNV-link project concerning: finding ways to support the production systems within the LA.
Participants: *Mayors of the LA, Universities, producers, cultural associations.*
March 2017

Meeting under the HNV-link project concerning: the active participation of the communities in the management of HNV areas.
Participants: Mayors from the LA, Universities
February 2017

The installation of new farmers in the LA could be ~~is~~ linked to the crisis but in parallel it responds to societal new expectations by accepting and honoring a heritage of managing the human-animal -nature relationship in mountainous areas. This recovery could be thought as ~~is~~ a new form of institutional, socio-cultural reintegration of the productive activities in a degraded agri-ecological system. In this procedure public policies and services, as well as Diaspora's communities coincide in transfering knowledge and providing financial support to young people (in the form of aid for installation and/or by purchase as consumers' local products). In order for this endeavor to be successful and sustainable it is necessary to redesign land uses for cultivated pastures, pastures/semi-natural and natural areas within the HNVF systems. The participation of all those who can contribute to the synthesis of endogenous knowledge innovative thinking to the management of the commons in a new governance scheme under the auspices of local government, is a prerequisite.
Investing in biodiversity conservation highlights the role and enhances the image of HNVF systems, responds to Diaspora's interests for balanced and equitable management of the natural and cultural heritage (residence, housing, ownerships rights) and highlights communities as an HNV area that produces local quality products and attracts tourists.

Some dimensions of the contributions by each of the stakeholder groups involved

Old producers: Knowledgeable of inherited collective management systems of territory
New producers: preservation of HNVf systems contributes to productivity, increase of the products' value, recognition of their holding's multifunctionality and their quality of life.
Diaspora's communities/cultural associations: management of the HNV farmland concerns community's future and the protection of their own interests (fire prevention, settlement management, quality of life in the village etc.).
Municipalities: preservation of HNVf systems responds to the management and utilisation of its natural resources and territorial cohesion.

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A thematic network on High Value Farming
Learning, INnovation & Knowledge

LEARNING AREA « The Burren » (Ireland)

A BASELINE ASSESSMENT

Authors:
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Date: July 2017

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A portrait of the area

The Burren is located on Ireland's mid-western coast and encompasses sections of two Irish counties, Clare (north) and Galway (south).

The Burren is the most extensive glaciated karst landscape in Western Europe and comprises two primary landscape units: the Burren uplands to the west (often 2-300m above sea level) and what are sometimes referred to as the 'Gort lowlands' (<100m asl) to the east. The extent of the Burren is defined by those areas dominated by karst limestone or shallow basic soils with semi-natural grassland. It should be noted however that this does not correspond precisely with administrative units that are used from now on to present agriculture and populataion data (though the differences are small).

The name Burren is derived from the Gaelic word 'Boireann' meaning 'Place of Stone'. The Burren is a geographical, rather than a political, unit and is c.72.000ha in extent, as defined by the presence of outcropping limestone.

Most of the Burren is privately owned and farmed, though c.2000ha is publicly owned, forming a National Park and several Nature Reserves.

Geology

The Burren is dominated by exposed limestone bedrock with occasional shale and sandstone and a thin soil cover.

The limestone is composed of the calcium-rich skeletal remains of marine organisms (e.g. sea-lilies, ammonites, urchins, corals, brachiopods) that populated the warm, shallow sea that lay over the region during the Carboniferous period. These were eventually compressed by their own weight and that of the sea above, and subsequently elevated to reveal the massive, fossil-rich beds that we see today.

This limestone was formed 340m years ago and has been shaped by a range of forces – tectonic, glacial, 'solutional' and human – to create a very unique geological heritage.

The limestone bedrock is important for farming as it offers a 'dry lie' for outwintering cattle, almost like an underfloor heating system!

The geological heritage of the Burren has been recognised by its award of UNESCO Geopark Status (along with the adjacent Cliffs of Moher).

Landscape Structure – Burren Uplands

These hills exhibit bare limestone pavements and deep grikes (depressions). Soils are very thin in places and water drainage is subterranean.

The maximum height of the limestone hills in the Burren is 330m. Many of the hills plateau at 150m.

The Burren Uplands lie in County Clare and are the most widely known and visited part of the Burren. They are particularly rich in archaeological sites, having always been attractive to farmers due to their light, fertile, free draining soils. They also contain some of the best pasture and meadow habitats, the conservation of which is a high priority. A series of terraced hills separate the Burren uplands from the Gort lowlands to the east.

These areas provide the habitats for the celebrated Burren flora and rough winter grazing for livestock. The intervening valleys and a low-lying coastal strip of glacial drift are more species poor and are often used for more intensive farming practices.

Landscape Structure – Burren Lowlands

The east Burren ('Gort') lowlands are much more low-lying and flat than the uplands and feature a wide range of wetland habitats interspersed with outcrops of rugged limestone.

This low-lying limestone plain is a 'covered karst' and is characterised by thin layers of fertile soil with outcroppings of limestone pavement and an extensive system of calcareous lakes and fens of high conservation importance. This includes the most extensive area of naturally functioning turloughs in Ireland. Grazing levels are lower in the Burren lowlands as there is more outcropping rock and less soil cover on much of the area. One of the main conservation priorities in the Burren lowlands is to prevent eutrophication of the wetland habitats.

Typical wetland habitats include calcareous fens, oligotrophic lakes, petrifying springs and seasonal lakes known as turloughs.

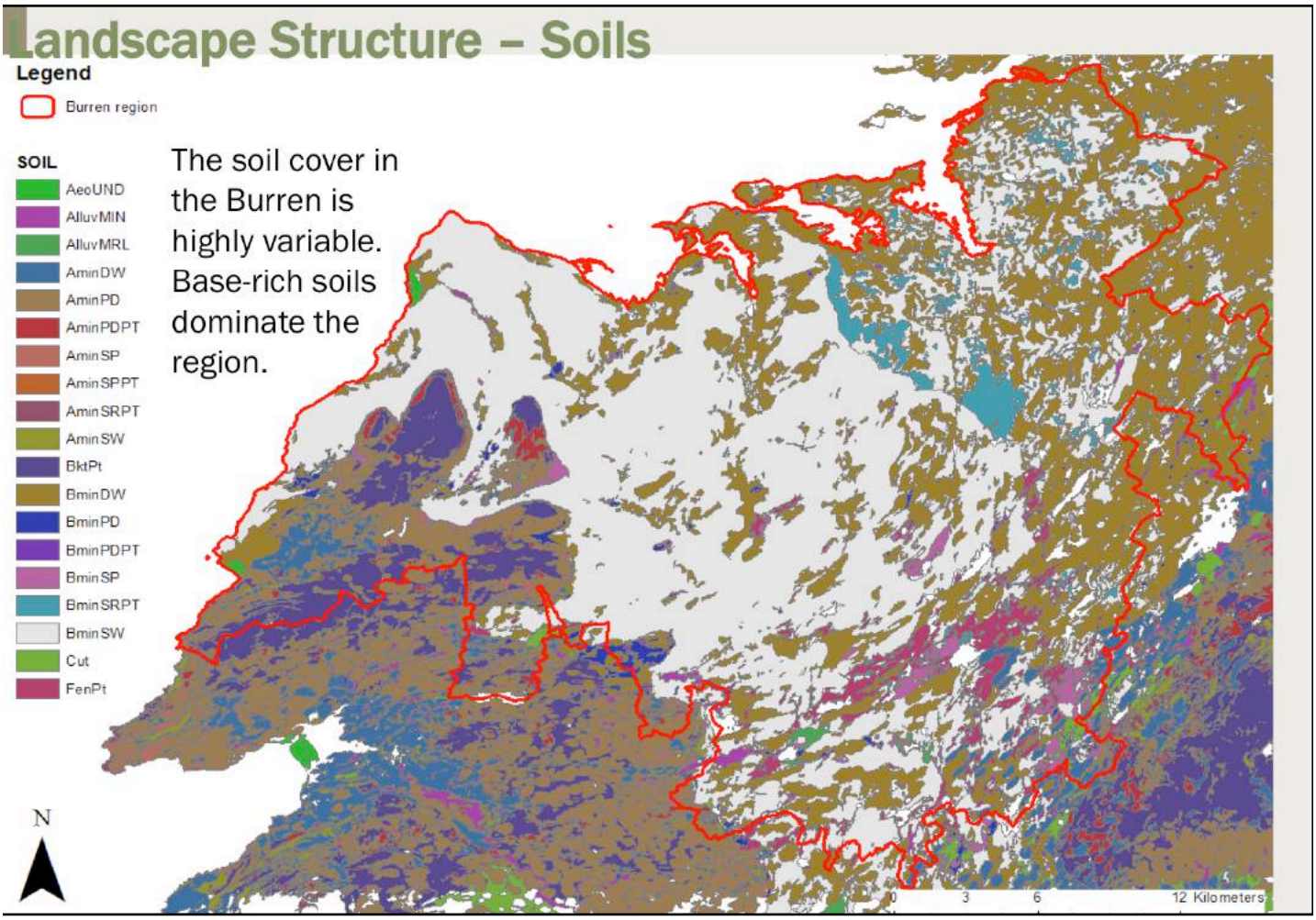
The Burren lowlands also contains important grasslands and heaths. Unlike the upland grasslands, these are not always used
for winter grazing.

Landscape Structure – Hydrology

The Burren has been shaped by water – directly through glaciation and water solution, and indirectly by influencing the human/agrarian use of the landscape.

The unavailability of water in summertime in this free-draining landscape where most of the water flows underground, forced farmers to adopt a system of winter grazing which in turn shapes the biodiversity and cultural traditions of the Burren.

The River Fergus which lies to the south of the Burren drains a considerable part of the Burren plateau to the north and northwest of the river and much of the lowland areas. The catchments north of the Burren plateau drain mainly through submarine outlets in the sea at Galway Bay (Deegan, 2016). The western Burren catchment drains largely into the Atlantic Ocean. Unusually for a karst landscape, there are surface waters in the Burren uplands. To the southeast of the plateau are numerous lakes, for example Loughs Inchiquin and Bunny. These occupy shallow hollows in the limestone and are hydrologically connected to the groundwater body of the lowlands (Drew, 1990). There are also two surface rivers: the Caher River and the Aille River (Drew 1990). Geomorphology and hydrology are intimately linked in a karst landscape and the hydrology of the low Burren is particularly distinctive and complex due to extensive karstification. There is extensive groundwater-surface water interaction in this area and the turloughs in the Burren lowlands appear to be hydrologically linked. There is also groundwater-sea water interaction and the water level of turloughs close to the sea can vary according to the tide (Deegan, 2016).

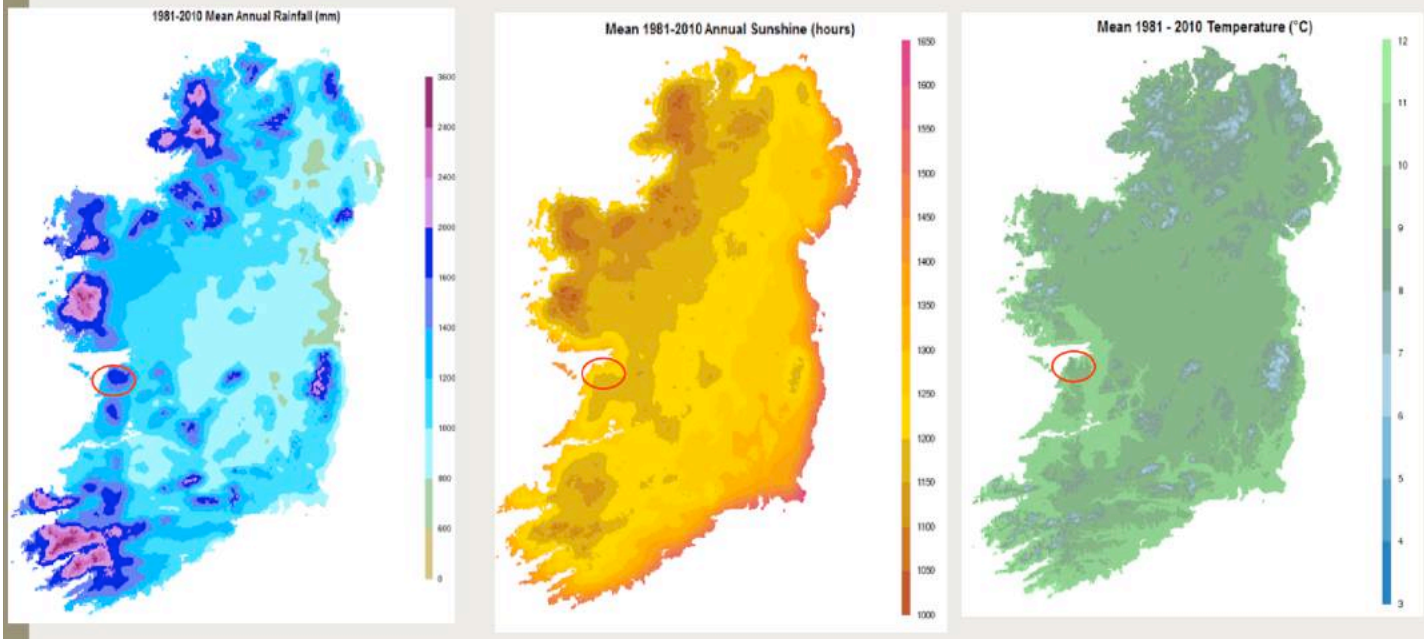


The most common soil type in the area is Rendzina – a young, dark, calcimorphic soil which supports a typical Burren flora and is really only suitable for rough (winter) grazing.

Brown earth soils dominate the more fertile valley and coastal areas, lending themselves to more intensive tillage and dairy farming systems.

Climate

The climate of the Burren is similar to the climate of the rest of Ireland and is mild and wet throughout the year. The mean daily temperatures in the Burren are 14 °C in July and August (the warmest months) and less than 5 °C in January and February (the coolest months). The average annual rainfall is high, c.1525 mm, with October to January being the wettest period when rainfall is approximately 160 mm per month. Snow is rare in the Burren. The mild winters in the Burren facilitate the outwintering of cattle, the free-draining substrate enables the rapid evacuation of surface water.



Climate data for Ireland showing mean rainfall, sunshine & temperature per annum 1981-2010. Source Irish Meteorological Service

The high rainfall levels in the Burren flush nutrients from the thin rendzina soils, while summer droughts on can lead to desiccation of soils and vegetation. Thus the Burren can represent a very stressful growing environment for many plants, offering a competitive advantage to more compact, stress tolerant plants such as the herbs for which the Burren is famous. Indirectly, the geology and climate impact on biodiversity through agricultural practices such as winter grazing – farmer's response to the hydrological limitations of the landscape (poor summer water), exploiting the geological (the winter warmth of the limestone) and climatic (mild winters) conditions.

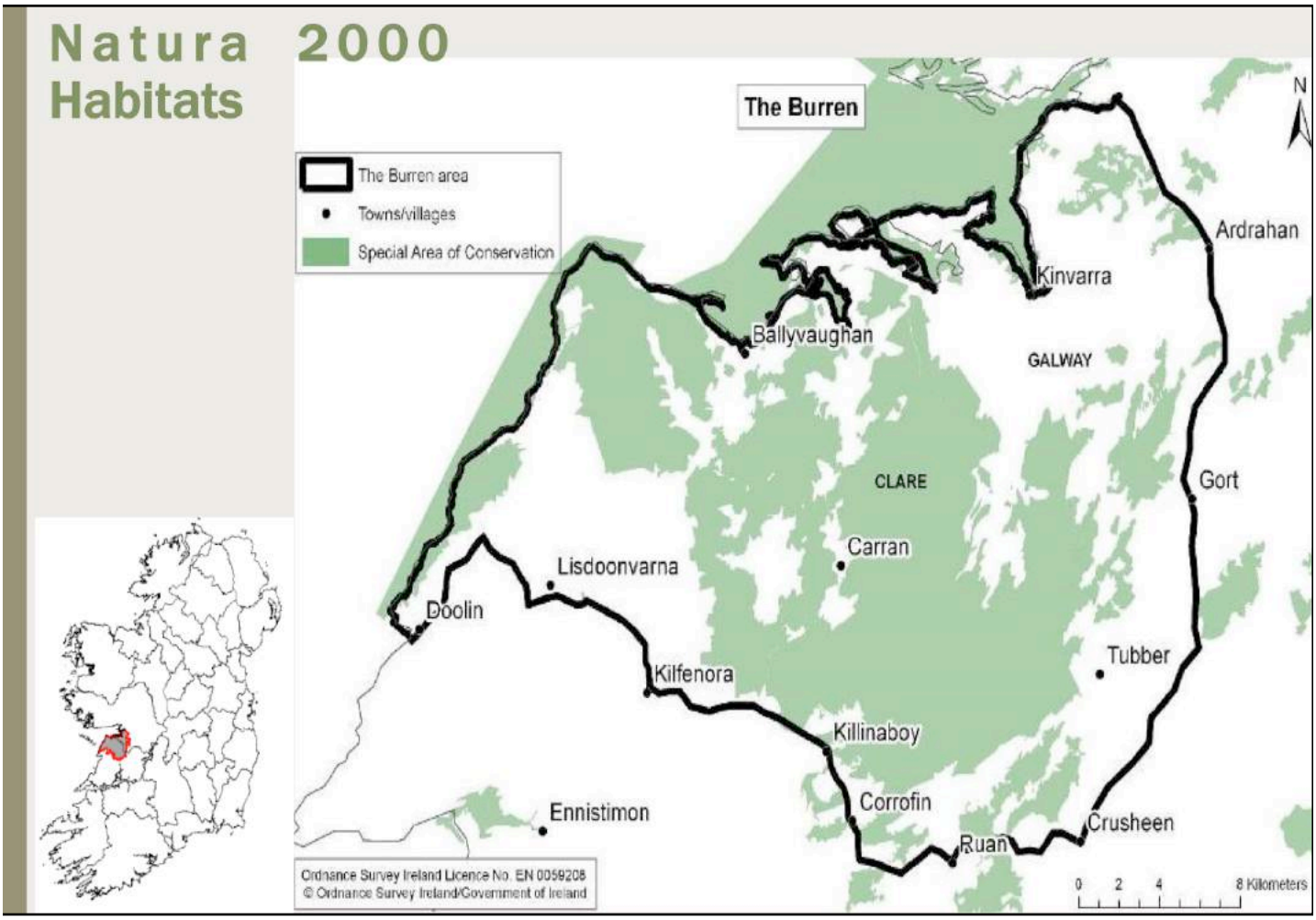
Habitats

The Burren hosts a wide range of habitats. While none of these habitats is unique to the Burren, the scale and quality of these habitats in the Buren is unparalleled.

Habitats include:

- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) (6210)
- Alpine and Boreal heaths (4060)
- Juniperus communis formations on heaths or calcareous grasslands (5130)
- Lowland hay meadows (6510)
- Limestone pavement (8240)
- Turloughs (3180)
- Calcareous fens (7210)
- Petrifying springs (7220)

Other important habitats include Atlantic Hazel woodland (the extent of which is increasing in the area as grazing pressure decreases). Hazel woodland contains a rich ground flora and provides extensive habitat for many different fungi and lichens, some of which are extremely rare (Deegan, 2016).

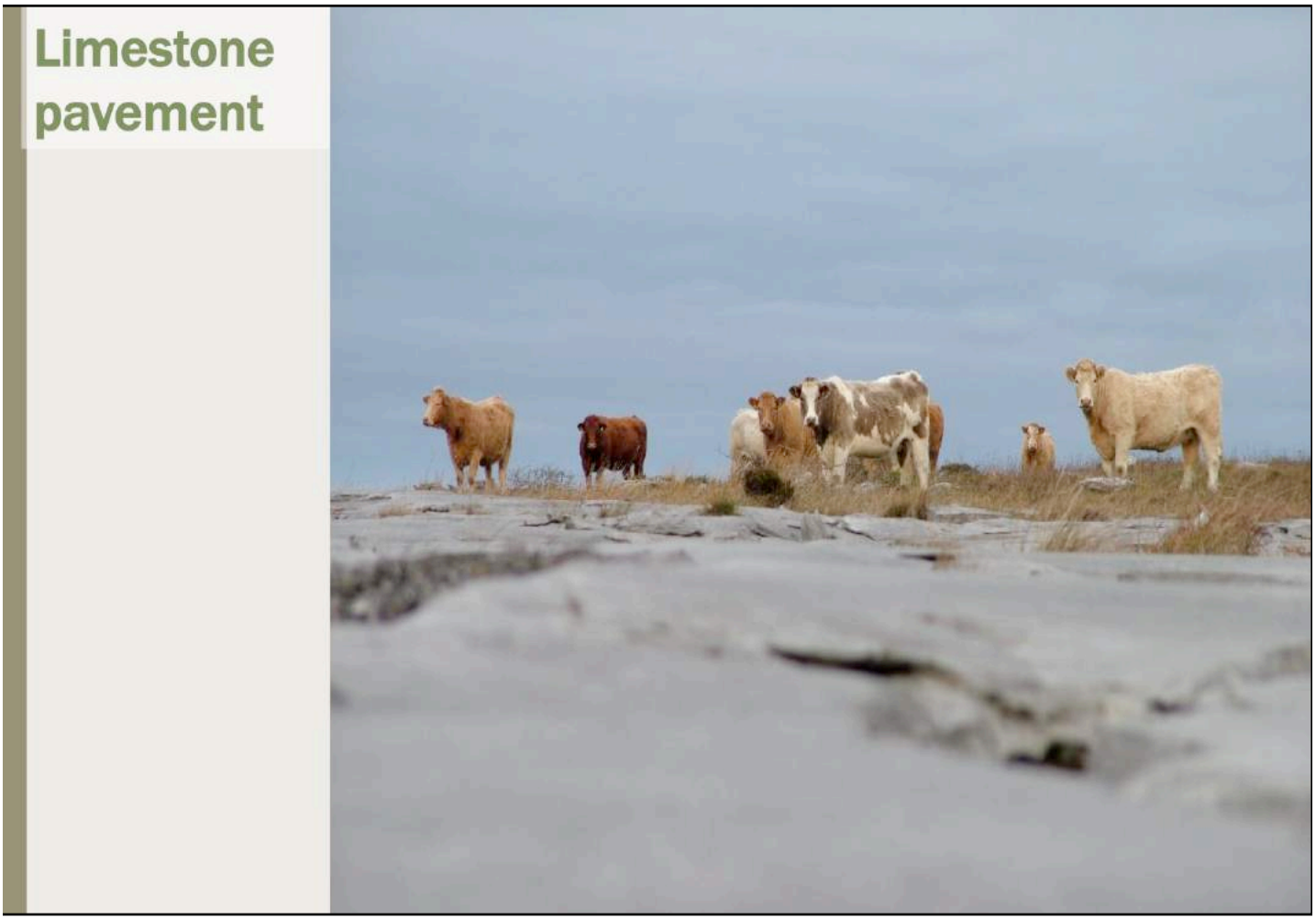


Over 30,000 ha of the Burren have been designated as Special Areas of Conservation under the Habitats and Species Directive (92/43/EEC), while an additional area of almost 2,000 ha is designated as Special Protection Area. These designations were introduced in the late 1990s to encourage biodiversity conservation and environment protection. These policies resulted in a mitigation of some of the negative impacts of agriculture on the environment – including land reclamation and over-intensification which were significant issues in the 1980s and 1990s.

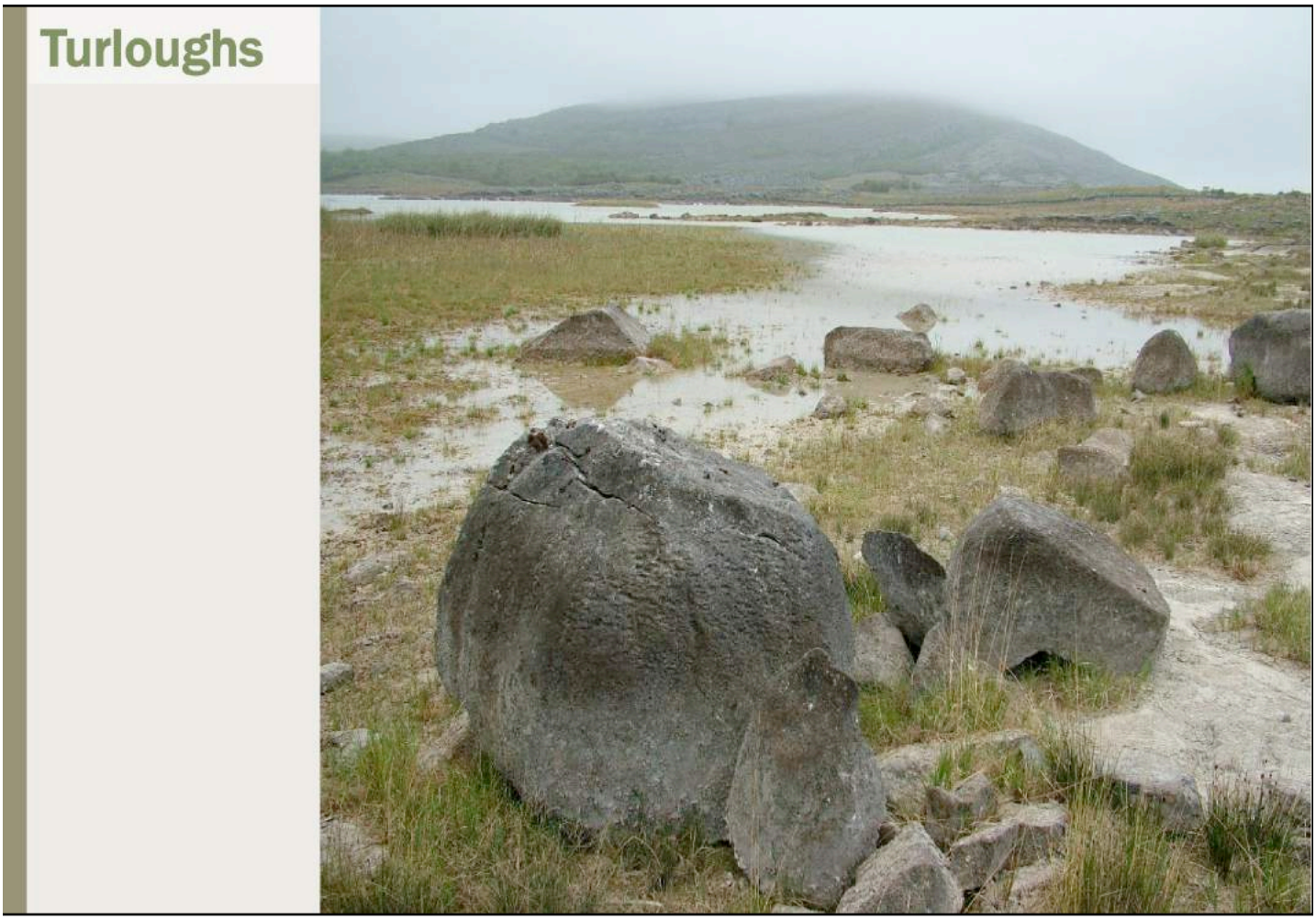
Semi-natural dry grasslands

and scrubland facies on calcareous substrates

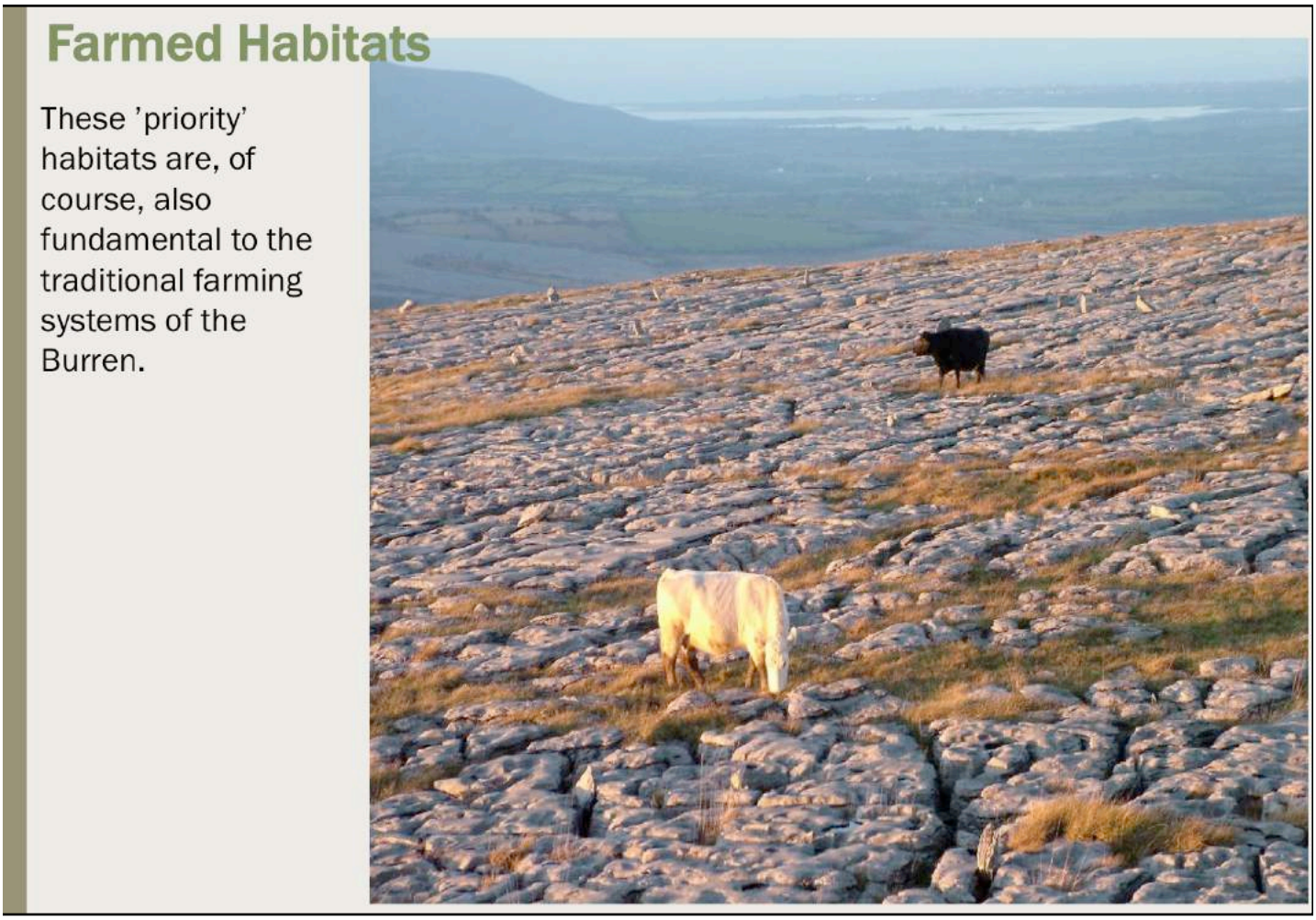
The Burren is a very important site for semi-natural grasslands on calcareous substrates. Wet and neutral grasslands are common elsewhere in Ireland but no other area can rival the Burren for concentration or species-richness of calcareous grasslands. The image above shows a grassland near the coastal upland pf Black Head. Harebell (*Campanula rotundifolia*), Ox-eye Daisy (*Leucanthemum vulgare*), Devils-bits Scabious (*Succia pratensis*), Red Clover (*Trifolium pratense),* Crested Dogstail *(Cynosurus cristatus*), Blue Moorgrass (*Sesleria caerulea*), Sweet vernal grass (*Anthoxanthum odoratum*), Eyebright (*Euphrasia sp.*) and Tormentil (*Potentilla erecta*) are all visible.



Ireland has the largest area of limestone pavement in the EU and is common throughout the Burren. While it does occur elsewhere in Ireland, notably small areas around Lough Corrib and on the Aran Islands, the most extensive limestone pavement occurs in the Burren. Limestone pavements are both geologically and biologically important resources. The structure of limestone pavement consists typically of blocks of rock, known as clints, separated by fissures, or grikes. There is considerable variation with some areas consisting of massive blocks of smooth, relatively un-weathered pavement with well-developed grikes to areas where the grikes are very narrow and shallow. Finely fractured pavements or shattered pavements, where grikes are almost absent, also occur. The rock surface is almost devoid of overlying soils (considerably less than 50% cover) except sometimes for patches of shallow skeletal soils, although more extensive areas of deeper soil occasionally occur



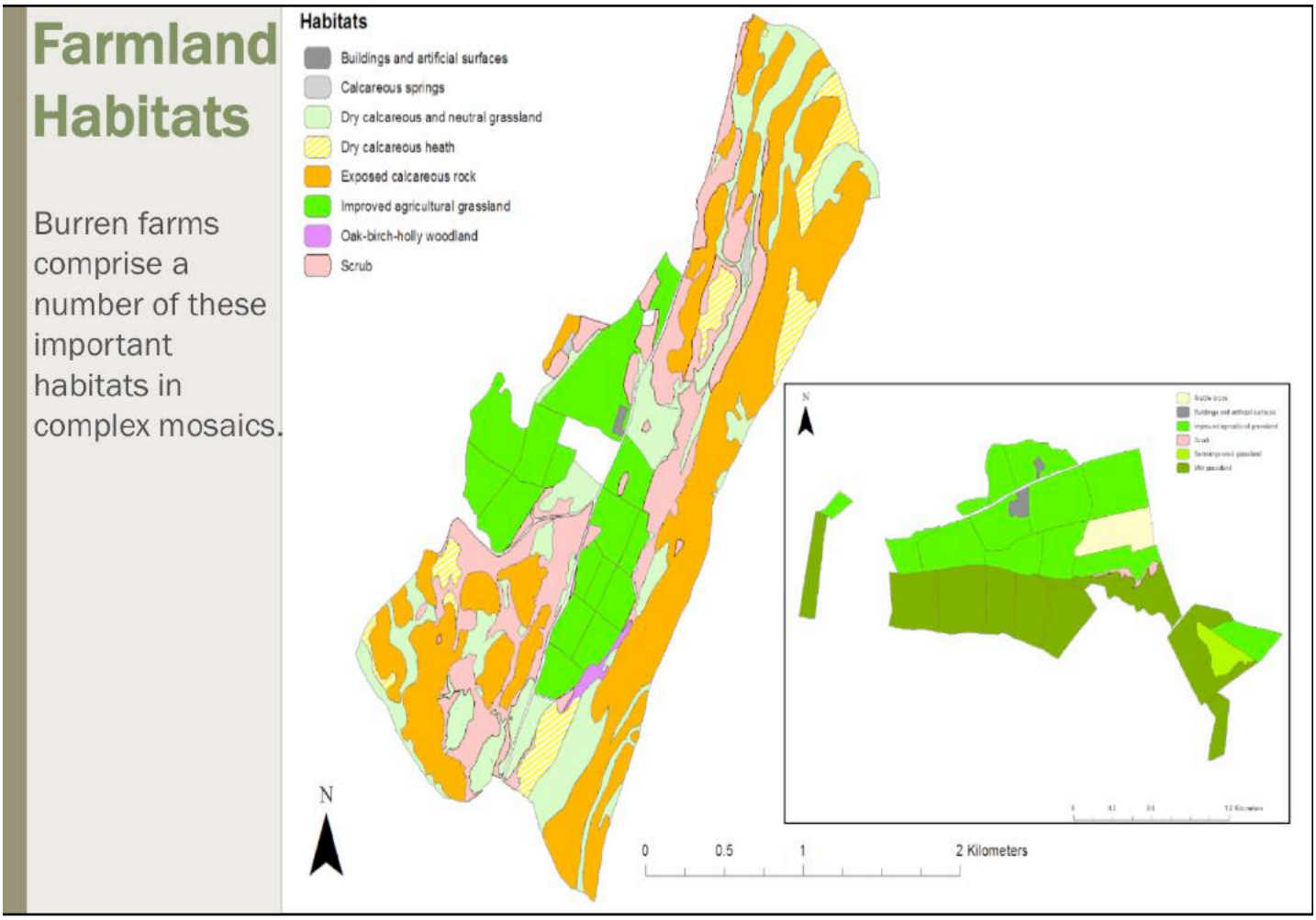
The Burren is an important area for turloughs. Again, they do occur elsewhere in Ireland but they occur in high densities here. Turloughs are groundwater-dependent wetlands that occur in limestone depressions mainly in the karst landscape of the west of Ireland (Sheehy Skeffington et al. 2006). The hydrological regime of turloughs is linked to precipitation, which may result in flooding at any time of the year during high rainfall events, although flooding generally occurs between October and April (Coxon 1987). Turloughs are traditionally important summer grazing pastures and the substrate and grazing management are also important factors in determining species distribution (Goodwillie 2003).



Limestone pavement (8240) provides a dry, warm habitat for out wintering cattle, while turloughs (3180) and springs (7220) provide them with a calcium rich water supply.

Cattle rely on the species rich grassland forage provided by the Burren's grasslands and heaths (6210 & 4060) with hay from medows (6510) providing supplementry feeding for stock in bad weather and for sick animals.

In spite of the importance of these priority habitats for agriculture, much of the area is not considered 'utliizable' for grazing and thus not eligible for Basic Payment Scheme funding. In a survey of 200 Burren farms in 2016, on average only 60% of the area was BPS eligible.



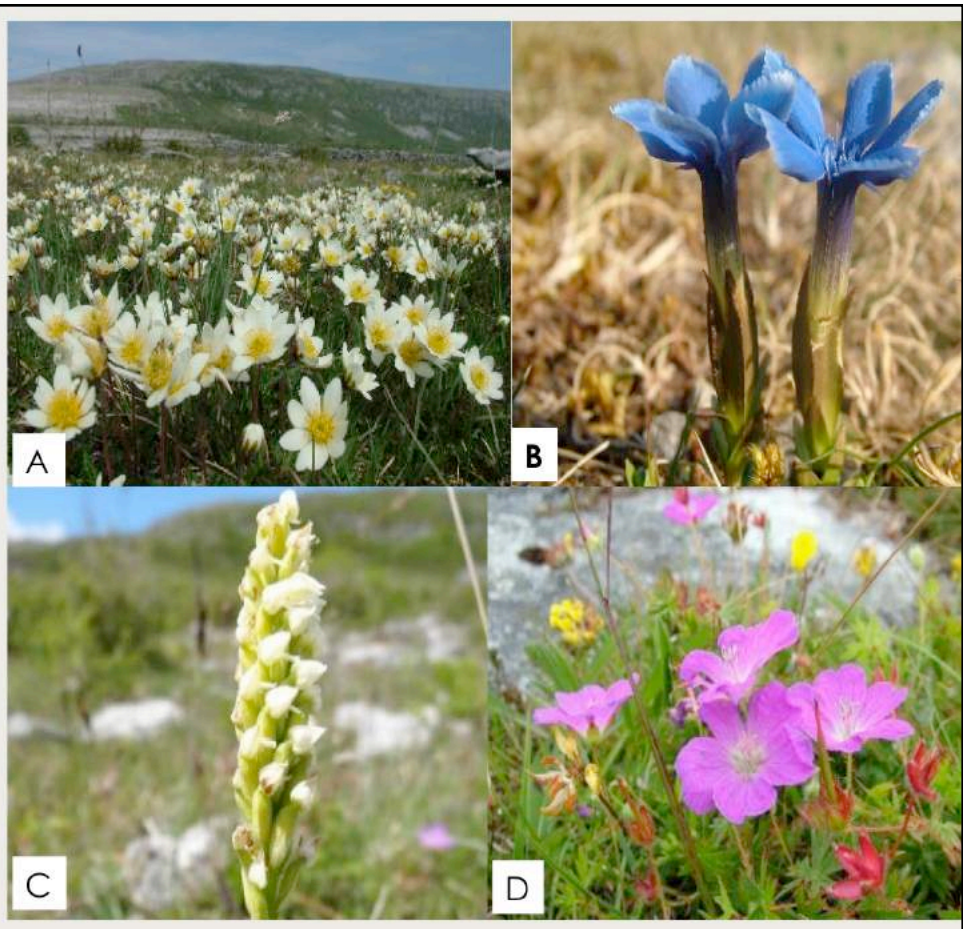
Here is an example of a Burren farm with all habitats mapped as part of the IDEAL-HNV project.
A typical non-Burren farm is presented in the inset for contrast.
Note the complex mosaics of semi-natural habitats on the Burren farm and the more homogenous improved agricultural grassland areas.

Mosaics of hazel scrub, dry calcareous and neutral grassland, dry calcareous heath and exposed calcareous rock with patches of mature woodland are common on these farms. The improved agricultural grassland areas are essential for the functioning of these farms, providing grazing for summer and additional fodder for winter.

Flora

Over 70% of Ireland's 900 native plant species have been found in the Burren uplands, which represents less than 0.5% of the national area.

A) *Dryas octapetala*
B) *Gentiana verna*
C) *Neotinia maculata*
D) *Geranium sanguineum*

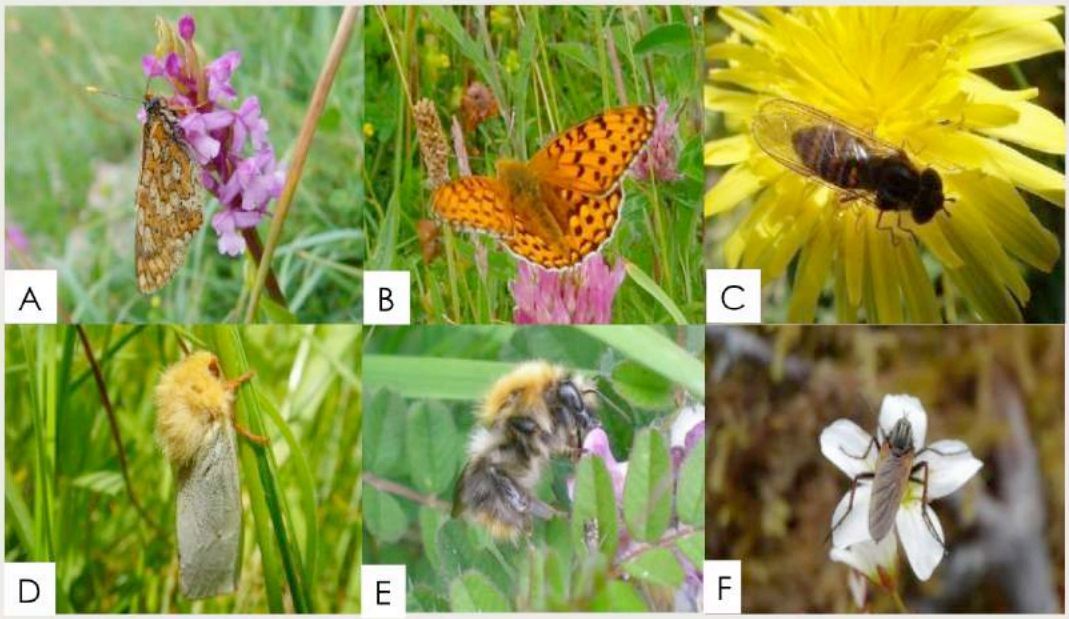


A total of 23 of Ireland's 27 orchid species and regional specialities such as the Alpine G*entiana verna*, the Arctic *Dryas octopetala* and the Mediterranean *Neotinea maculata* whose main British and Irish populations occur in the Burren.

Other relatively common species such as *Campanula rotundifolia*, *Antennaria diocia, Galium verum* and *Geranium sanguineum* are said to 'flourish so much more exuberantly in the Burren than elsewhere in Ireland' (Webb and Scannell, 1983).

Fauna - invertebrates

The diversity of habitats in the Burren supports a wide range of fauna. The flower-rich grasslands, scrub and woodlands are important for butterflies, snails, moths and pollinators such as bees.



A Pearl-bordered Fritillary (*Clossiana euphrosyne*)
B Dark Green Fritillary (*Argynnis aglaja*)
C Hoverfly (*Episyrphus balteatus*)
D Ghost moth (*Hepilaus humuli*)
E Common Carder Bee (*Bombus pascuorum*)
F Diptera sp.

Indeed, the Burren is recognised as one of the best surviving areas for bumblebees in Ireland (Santorum and Breen, 2005) and is home to at least half of the 570 macro-moths recorded in Ireland and 30 of Ireland's 34 butterfly species. Over 60 species of snail are found in the Burren, as are most of Ireland's native bat species.

Fauna - vertebrates

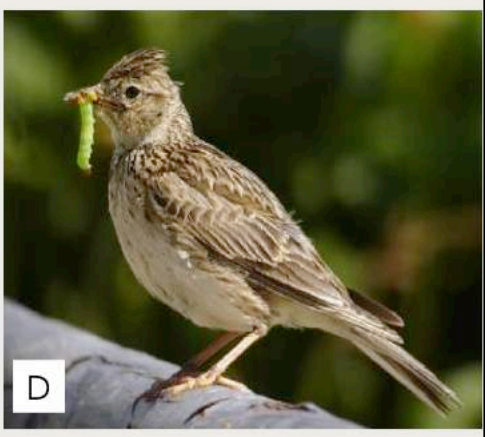
(l-r) Common Lizard (*Zootoca vivipara*), Slow worm (*Anguis fragilis*), Common frog (*Rana temporaria*)

Large herds of feral goats (*Capra hircus*) are also common in the Burren, a reminder of a more diverse farming systems that once pertained here.

Ireland's only native reptile, the common lizard (*Zootoca vivipara)* and the introduced slow worm (*Anguis fragilis)* occur in the area. Ireland's only native frog (*Rana temporaria)*, is also very common in the region

Avian fauna

One hundred and two bird species have been recorded breeding in the Burren which represents approximately 70% of Ireland's breeding birds (Lysaght, 2002).



A Yellowhammer
C Red-billed Chough

B Common Cuckoo
D Eurasian Skylark

Farmland birds such as Yellowhammer (E*mberiza citrinella)*, Common Cuckoo (*Cuculus canorus)*, Red-billed Chough (*Pyrrhocorax pyrrhocorax),* Eurasian Skylark (*Alauda arvensis)* and Common Linnet (*Carduelis cannabina)* are declining and becoming increasing localised in many parts of Europe. However they can still be found in suitable habitats in the extensive, farmed landscape of the Burren.
Several birds of prey may also be found in the Burren, in particular the Peregrine Falcon (*Falco peregrinus*).

The persistence of such nationally and internationally notable biodiversity in this area is intrinsically linked to farming. There is a long and rich tradition of farming in the area. From an agricultural perspective, the Burren is primarily renowned as the land of the 'dry lie' - owing to its capacity for the extensive outwintering of 'store' cattle, or 'outliers', which to this day raise a premium in markets due to their general health and ability to thrive when subsequently removed to finishing grass (Dunford, 2001, 2016).

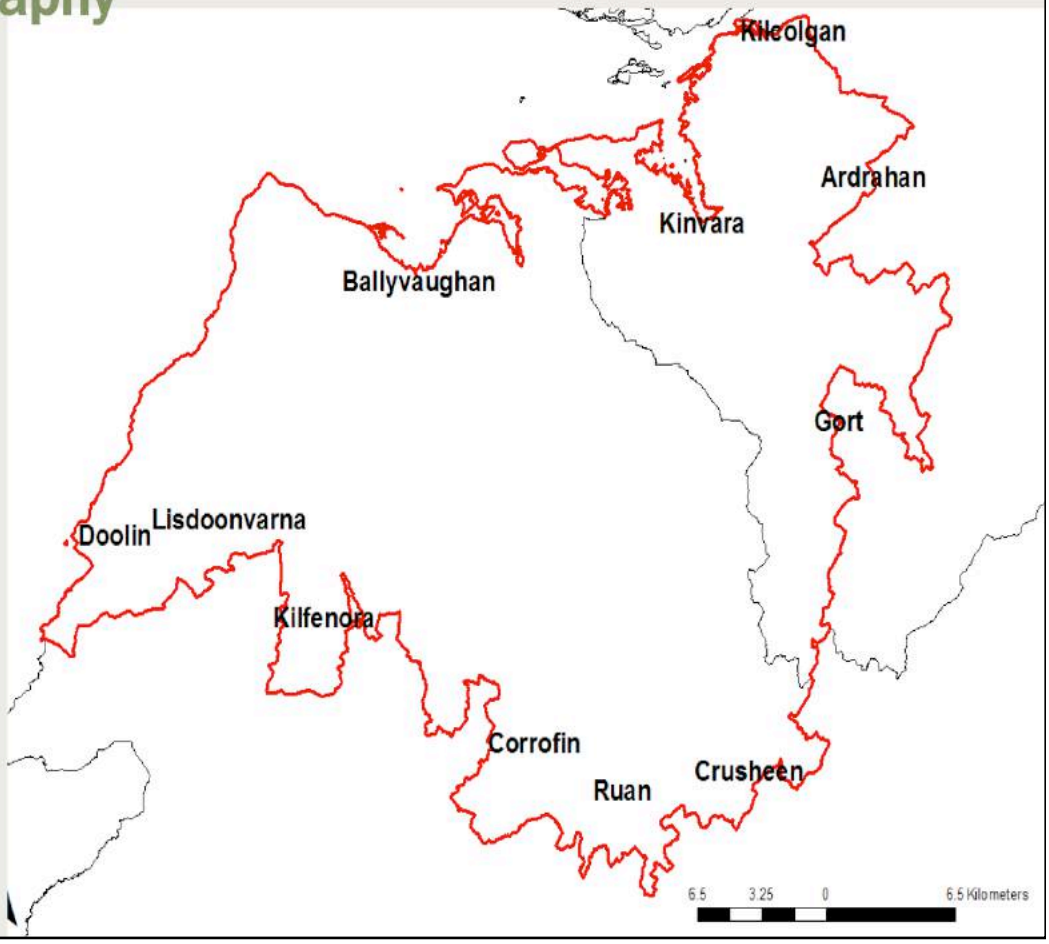
Human Geography

The overall population of the Burren is 15,389 according to the 2011 population census

There are eleven small towns in the region, mainly on its periphery, with populations of up to 2,500 people.

The towns form a necklace around the learning area, and these towns are relatively well connected (better roads) to the main urban centres of Galway, Ennis, Shannon and Limerick where many Burren residents work. The population of these towns has grown in recent years.

Within the Burren itself there are several small rural villages, the population of which has continued to decline in recent years, resulting in a withdrawal of services.



These towns rely to a lesser or greater degree on tourism, being easily accessible and with reasonably good levels of services still available. Most of these towns grew strongly over the course of the ill-fated economic boom known as the 'Celtic Tiger' but some – such as Gort – suffered hugely during the subsequent recession.

The inland Burren in contrast is very rural and with very poor infrastructure (roads, signage, broadband, mobile phone signal) and contains a few small villages – running west to east these are Fanore, Carron, Boston and Tubber. In general, these smaller 'agricultural' villages and their associated townlands continue to suffer from steady population decline and the withdrawal of services (post offices, shops, church) and decline in school enrolments and social outlets. Traditionally the economy of the Burren, as with the rest of rural Ireland, has been dominated by agriculture. In the last few decades however the market has changed substantially with the development of other industries such as tourism and technology. Many Burren families have at least one member working off-farm. Many of these work in Galway, Ennis, Limerick and Shannon where some large biotech, transport and IT companies are based, as well as major hospitals and universities. Most such work is within one hour's commute from the Burren, and while such workers continue to reside in the Burren they may not interact and utilise local facilities e.g shops, schools etc which, partly as a result, continue to decline. This off-farm work usually provides a reliable source of good income for a fixed work day, so the associated farm business has to be restructured to become more efficient to facilitate this off-farm job, which has a big impact on how the land is managed and which in turn has a big impact on the landscape itself.

Farming population

1,561 people in the Burren identified themselves as farmers in 2010, a (surprisingly) small decrease from the 1991 figure.

	Burren					Ireland				
	1991		2010			1991		2010		
Farmer age	No.	%	No.	%	% Change since 1991		%	No.	%	% Change since 1991
under 35	237	14.7	106	6.8	-55.3	21504	13.3	8658	6.2	-59.7
35 to 44	360	22.3	279	17.9	-22.5	32247	20.0	24480	17.6	-24.1
45 to 54	323	20.0	378	24.2	17.0	35312	21.8	34500	24.8	-2.3
55 to 64	333	20.7	410	26.3	23.1	36077	22.3	34946	25.1	-3.1
65 and over	359	22.3	388	24.9	8.1	36479	22.6	36510	26.2	0.1
Total no of farmers	1612		1561		-3.2	161619		139094		-13.9

The main change from 1991 would appear to be the increasing age profile of Burren farmers with a substantial loss of younger farmers (under 44) to the older cohorts, but very low levels of young farmer recruitment. This mirrors the National trend of an ageing farmer population. Turnover of land is very low in the Burren, and it is common for those inheriting land to retain the land while either farming it as a part-time occupation or renting it to other farmers. Increasingly, Burren farmers are working part- or full-time off the farm, further reducing the labour available.

Farm size

The average farm size owned in the region estimated to be 39.39 ha (32.5ha Nationally). In the last twenty years the number of small farms (up to 30 ha) has steadily decreased as these are consolidated to form larger units. Similar trends can be seen nationally. The Burren has a higher percentage of larger farms than the National average – this is a reflection on the low productivity levels of Burren holdings where large holdings are often required for relatively low stock numbers.

	Burren					Ireland				
	1991		2010			1991		2010		
	No.	%	No.	%	% Change since 1991		%	No.	%	% Change since 1991
<10 ha	247	15.3	172	11.1	-30.4	43128	25.4	25337	18.2	-41.3
10-20ha	451	28.0	294	19.1	-34.8	48228	28.4	33481	24.0	-30.6
20-30ha	373	23.1	289	18.7	-22.5	30964	18.2	24618	17.7	-20.5
30-50ha	306	19.0	431	27.9	40.8	28406	16.7	30595	21.9	7.7
50-100ha	176	10.9	269	17.4	52.8	15532	9.1	20695	14.8	33.2
>100ha	60	3.7	88	5.7	46.7	3844	2.3	4663	3.3	21.3

Almost 80% of Burren's UAA was grassland that was used for pasture, hay or silage, and nearly 11% of the area was used for rough grazing. Farmland occupies almost 85% of the Learning Area.

Farm Size – Utilizable Areas

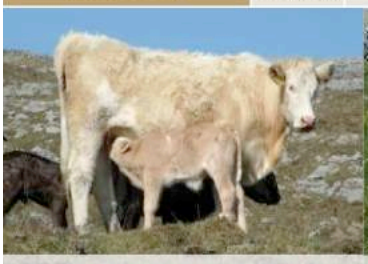
Many of the farms in the Burren uplands region are in excess of 100ha in size. Though this appears large, stocking rates are low as in reality an average of c.60% of a typical Burren winterage field/LPIS is deemed 'eligible' for farm payment (i.e. considered grazeable) (Dunford, pers comm).

Such 'ineligible' areas are shown above – areas with scrub (l) and exposed limestone (r). However, these marginal, extensively managed agricultural areas are among the most significant from a natural - and cultural - perspective.

Farming Systems

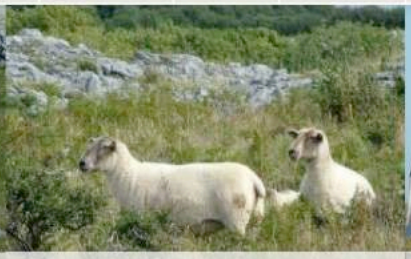
The Burren is a pastoral landscape. While in the past, mixed livestock farming was practiced (beef, dairy, sheep, goat) in recent years farming systems have become increasingly specialised in Suckler Beef production. Typically, a Burren farm today might contain an average of 30-40 suckler cows.

Livestock type	Burren					Ireland				
	1991		2010			1991		2010		
	No.	%	No.	%	% Change since 1991		%	No.	%	% Change since 1991
Dairy Cows	5,397		3186	1.7	-41.0	1,328,241	4.2	1,067,596	4.7	-19.6
Total Cattle	68,527		68677	37.3	0.2	6,894,245	21.8	6,587,155	29.0	-4.5
Total Sheep	63,714		22477	12.21	-64.7	8,866,863	28.1	4,732,875	20.8	-46.6



Suckler Herds

Beef Steers



Cattle & Sheep

Dairy Herds

Cattle are the dominant livestock in the region. The numbers of dairy cows fell by over 40% between 1991 and 2010. There were also falls in the number of sheep in the region (c.65%). Suckler cow-based beef systems are the dominant farm enterprise in the region, a change driven primarily by EU agricultural policy, most notably, the 'Suckler Cow Premium'. The extent of dairy and sheep farming in the region is, as a result of this and other factors, increasingly limited. The traditional system of grazing older beef cattle, along with some sheep and goats on the uplands is no longer widely practiced. Farmers concentrate on the production of high quality weanling (under one year) cattle due to the demand for these for export market. Breeds have also changed; formerly Shorthorns and Herefords were dominant, while today continental breeds are becoming increasingly popular, especially Charolais, Limousine, and Simmental, again due to their marketability. The nutritional and husbandry requirements of these animals is much higher than that of the native breeds, and so supplementary feedstuffs and housing are often necessary for their care.

Farming Systems – Stocking rates

Stocking rates in the Burren vary widely. Land is often sold/rented based on the grazing capacity rather then on the acerage.

Rocky winterage areas may have a carrying capacity as low as 0.1LU/ha while stronger winterages would suport 0.56LU/ha.
Middling winterages such as that shown here would have a carrying capacity of 0.28LU/ha.

Stocking rates in the Burren remain relatively low compared the national rates. They were estimated at an average of 0.65LU/ha (Dunford, 2001) an increase on previous figures and reflective of the more intensive management of the productive lowland areas – fertiliser and slurry inputs have enabled higher levels of production on these areas. Upland areas in contrast have seen a reduction in stocking levels, or in some cases, increased levels of supplementary feeding of silage – in either case, grazing levels continue to decline as a result.

Winter grazing

A unique agrarian practice known as 'winterage' occurs in the Burren. Winterage is a form of 'reverse transhumance' whereby cattle are put up on the rough grazing of the Burren uplands in October. They remain there until the following Spring at which point they are brought back down to the more fertile/improved lowland pastures.

This is a low-cost farming system that requires no housing nor large amounts of feedstuff but does require a higher labour input due to the inaccessible nature of the winterage lands.

This system is possible due to a combination of factors:

- Mild marine-temperate climate
- Long growing season
- Heat retention capacity of the limestone rock
- Well-drained permeable limestone pavements

For many generations, farmers have prized the 'dry lie' of the Burren as a place for storing cattle over winter. The warmth of the limestone, as well as the calcium-rich water and herb-rich diet, produced beef and lamb of superior quality described as far back as 1681 as 'much sweeter [than any land in this kingdom] by reason of the sweet herbs intermixed and distributed everywhere'.

Benefits of Winterage practice

Such benefits are many, including:

- Produces good quality store cattle
- Creates suitable environment for unique Burren flora
- Cattle graze off standing vegetation over the winter creating the ideal environment for the Burren's rich annual crop
- Keeps scrub encroachment at bay
- Very cost effective and efficient way of controlling scrub
- Animal's hooves create pockets for new plant species to colonise
- Animal dung is an important habitat for a range of insects and animal carcasses support a range of bird, mammal and insect species

Without grazers, plants such as blue moor-grass *(Sesleria caerulea*) *,* purple moor grass (*Molinia caerulea*) and heather (*Erica sp. and Calluna sp.)* would begin to dominate, out-competing smaller herbs for which the Burren is famous.

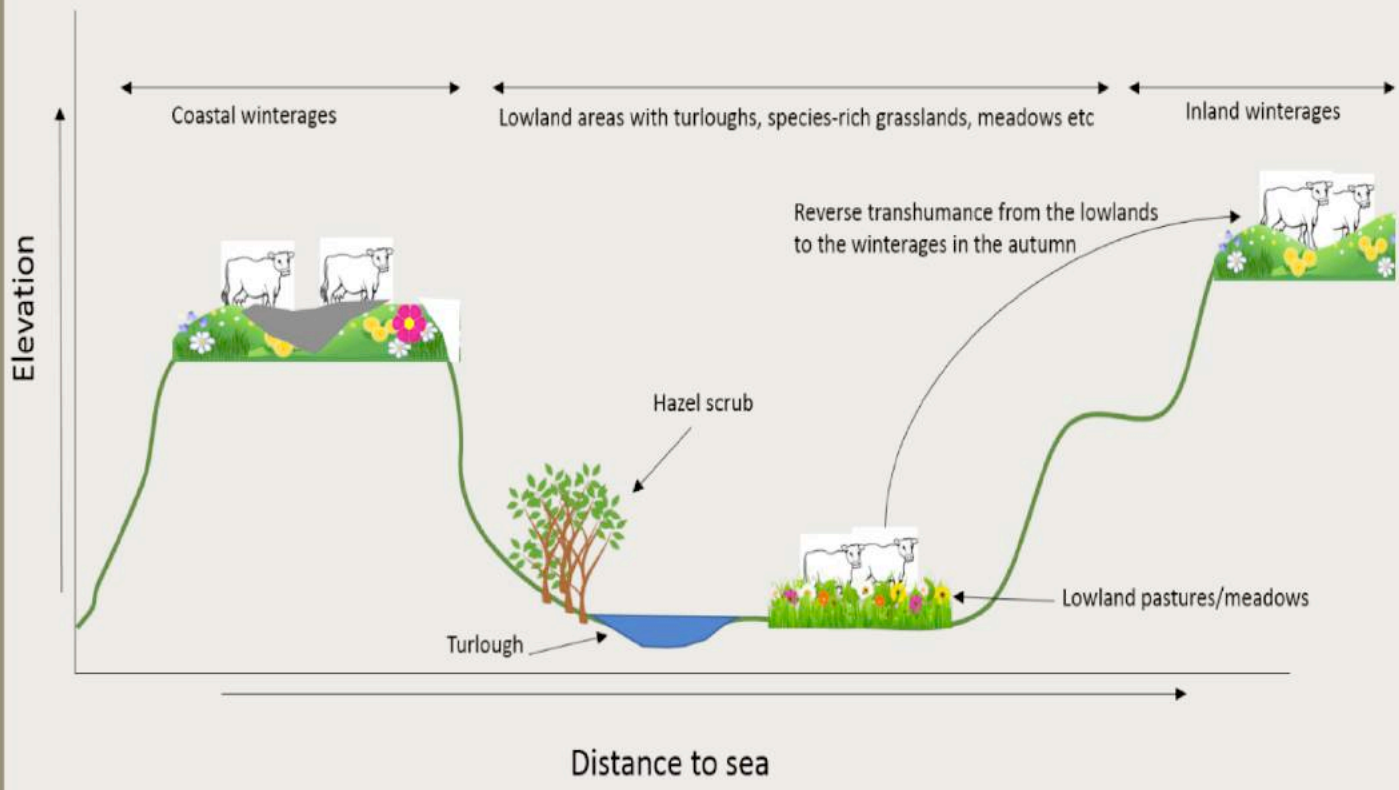
Over time shrubs such as hazel (*Corylus avellana*) and blackthorn (*Prunus spinosa*) would spread over the landscape, smothering the grasslands and any monuments they might contain.

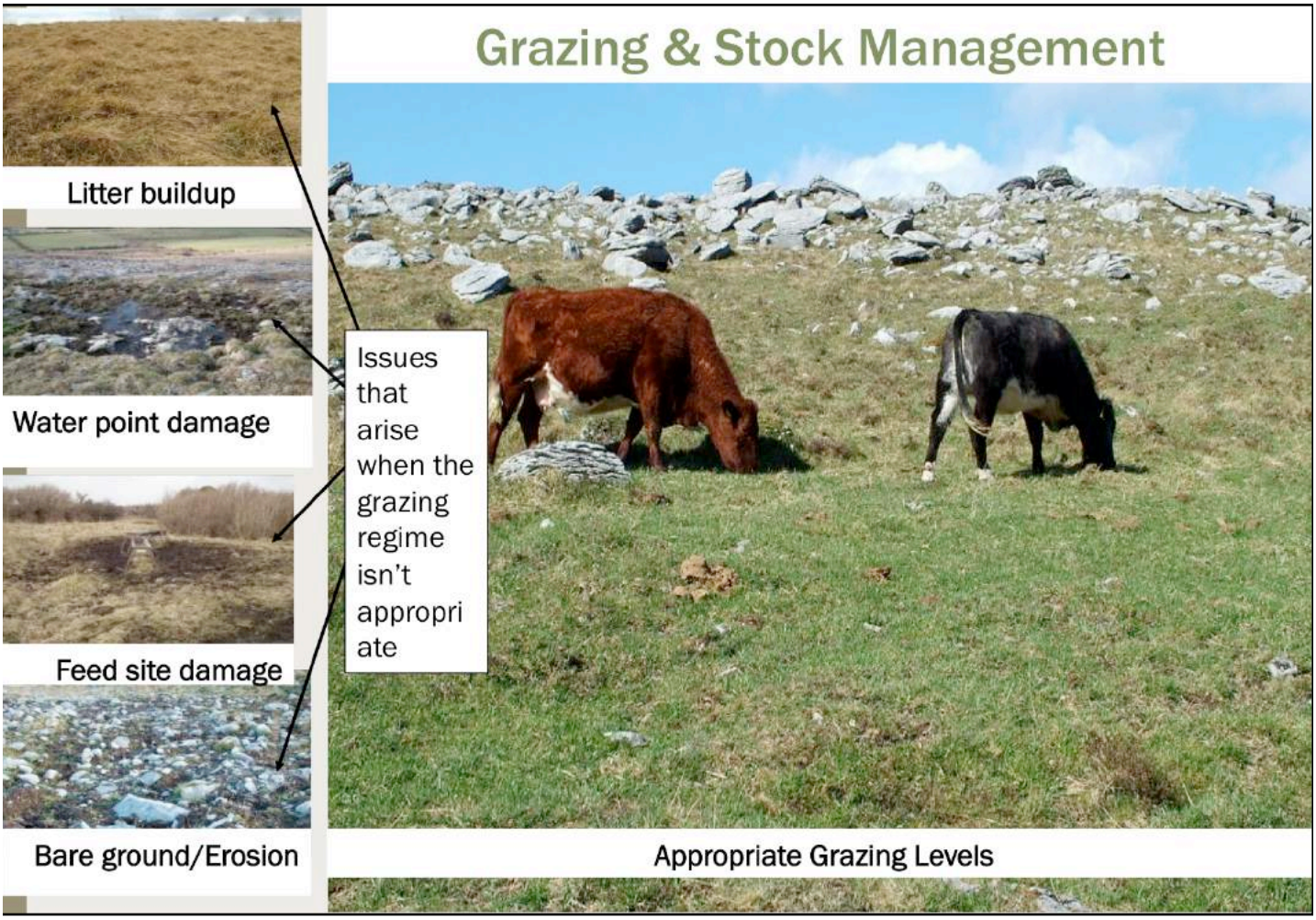
Cattle tracks would close up, further restricting access and movement and making herding more difficult.

Removing scrub is very costly and difficult, and maintaining a suitable grazing regime is the most cost effective way of avoiding, or at least delaying, scrub encroachment.

Burren transect

A representation of the Burren landscape from the coast to the inland areas





Grazing by livestock is the key to the conservation of the biodiversity and landscape of the Burren. Too little grazing, or too much - particularly in summertime or with heavy feeding - can badly damage the Burren habitats. Getting the grazing balance right requires skill, experience and time, but also ongoing work by the farmer such as maintaining walls, providing clean fresh water for livestock and improving access. Only by grazing a winterage well will the farmer make the most of the available forage, thereby reducing feeding and housing costs while also maintaining animal health and keeping the winterage in prime condition for future grazing.

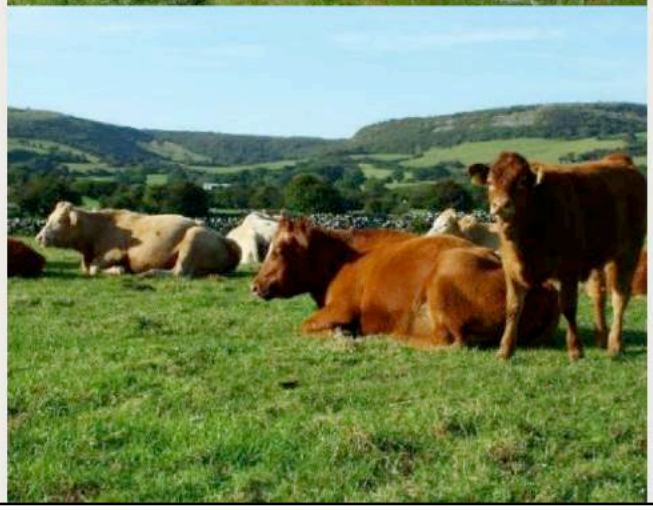
Non-Winterage areas

As mentioned earlier, Burren farms have complex habitat make-ups. As well as winterages, most Burren farms also contain areas of 'improved' land which are vital support areas for the HNV farmland areas of the farm.

The proportion of improved land to rough grazing (summer land to winter land) varies from farm to farm and is a key determinant of how that farm is managed. The improved summer land allows stock to regain condition while winterages are rested during the flowering season.

To ensure good, early spring grass, summer fields can be closed off in early Autumn (Sept - Oct) and stock moved to the winterage.

Stock can be moved back on to the green land in April or May though of course the timing of grazing will depend on the farming system, the weather, market and disease conditions that prevail on the farm in any given year.



The most popular marketplace among Burren farmers for trading livestock is Kilfenora mart in the south Burren, and also Ennis andGort marts. Many marts have recently introduced night-time sales to cater for the large number of part-time farmers in the area. Another significant aspect of modern farming practices in the Burren is the high level of mechanisation and external input involved. These efficiency-driven changes have led to the more intensive use of accessible 'lowland' areas of the farm, with fertiliser use and silage harvesting facilitating greater production levels on these areas. As a consequence of this, many upland areas have become disused, with silage and/or 'slatted' animal housing being used for overwintering animals instead.

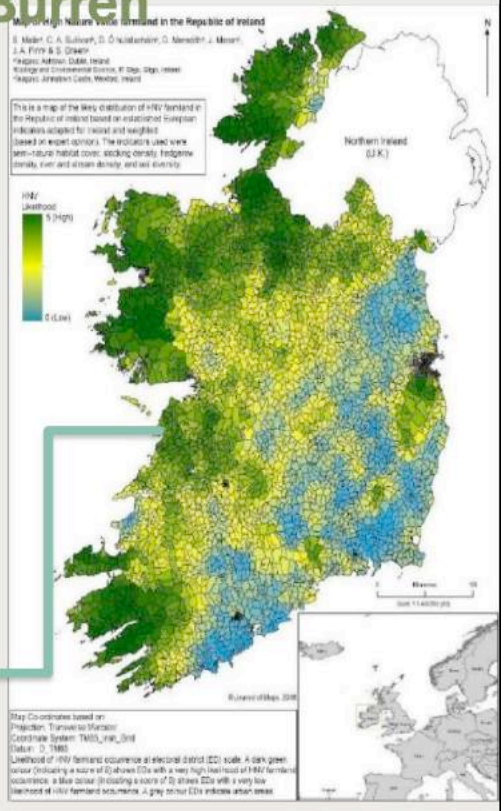
This contributed to a steady loss in plant species diversity, and indeed cultural heritage, on some holdings. Similar to other HNV areas, over half of all Burren farmers have a source of off-farm income. Many farmers are increasingly disenchanted with the relatively long hours, poor holidays and limited income available, and are electing to leave the land, at least on a part-time basis. With them goes a vast store of management knowledge and experience, a multigenerational link with the land, and a loss in the cultural and natural diversity of these farms.

High Nature Value farming in the Burren

The Burren region represents one type of High Nature Value (HNV) farmland in Ireland (see inset below). Much of the western seaboard and several upland areas in the south and east comprise HNV farmland.

The Burren is unique as most other HNV farmland areas are dominated by peatlands or wet grasslands but the Burren comprises large areas of karst limestone landscape. The Aran Islands and some small areas around Lough Corrib are the only areas comparable to the Burren in the country.

According to Sullivan *et al*, (in press) the region is typical Type 1 HNV farmland with no common land. It is dominated by semi-natural habitats (>75%) with a high proportion of grasslands. The average stocking density is >0.6 LU/ha



Distribution of areas with high HNVf potential in Ireland (green areas indicated HNVf) (Matin et al 2016).

Cultural landscape

The Burren has been aptly described as one 'vast memorial to bygone cultures'

The magnificent portal tomb at Poulnabrone – built by farmers 5,800 years ago- in the rocky heart of the Burren is one of the most easily recognised monuments in Ireland, but is only one very small piece of an extraordinary wealth of heritage to be found in the Burren

Clockwise from top left: Portal tomb (3,800BC), Stone wall (19-20th century), Turf Thuile (for fuel production), mid 19th century), Stone fort (c.6-900AD)

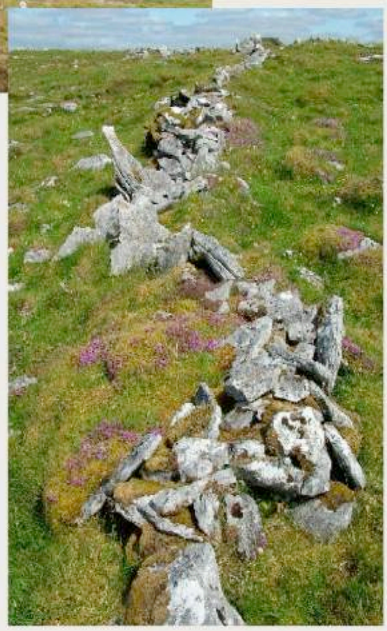
The density and diversity of monument and settlement types spanning from the Neolithic to modern times is staggering.
There are thousands of hectares of intact ancient agricultural landscape in the Burren, from the Neolithic and Early Bronze Age, particularly in the uplands

These archaeological landscapes include ancient field systems and associated settlements, boundary walls and enclosures which often occur in tandem with monuments such as megalithic tombs and cairns. The most numerous megalithic tombs in the Burren are the wedge tombs from the Late Neolithic – Early Bronze Age. The densest concentration of wedge tombs in Ireland can be found in the Burren on Roughan Hill, an intact 150 ha ancient landscape (Deegan, 2016). Other dominant built features include the ubiquitous drystone field walls from prehistoric and more recent eras, numerous ancient settlements including approximately 500 ringforts from the Early Christian Period, including the magnificent triumvallate (three walled) Cahercummaun and the chevaux-de-frise (an ancient defensive structure composed of upright stones) ringed Ballykingvarga and hundreds of abandoned pre-famine villages (Deegan, 2016). The density of monuments and settlement landscapes indicate the intensity of landuse and settlement over the course of the Burren's history. These ancient landscapes of intensive settlement are in stark contrast to the unpopulated areas of winter pasture in the uplands today.

Stonewalls

Stonewalls are the dominant field boundary in the Burren, and also on the nearby Aran Islands and east Galway landscapes.

Some of the walls in the Burren are thought to be of Stone Age origin (over 4,000 years old) and form extensive field systems which are of great archaeological significance.

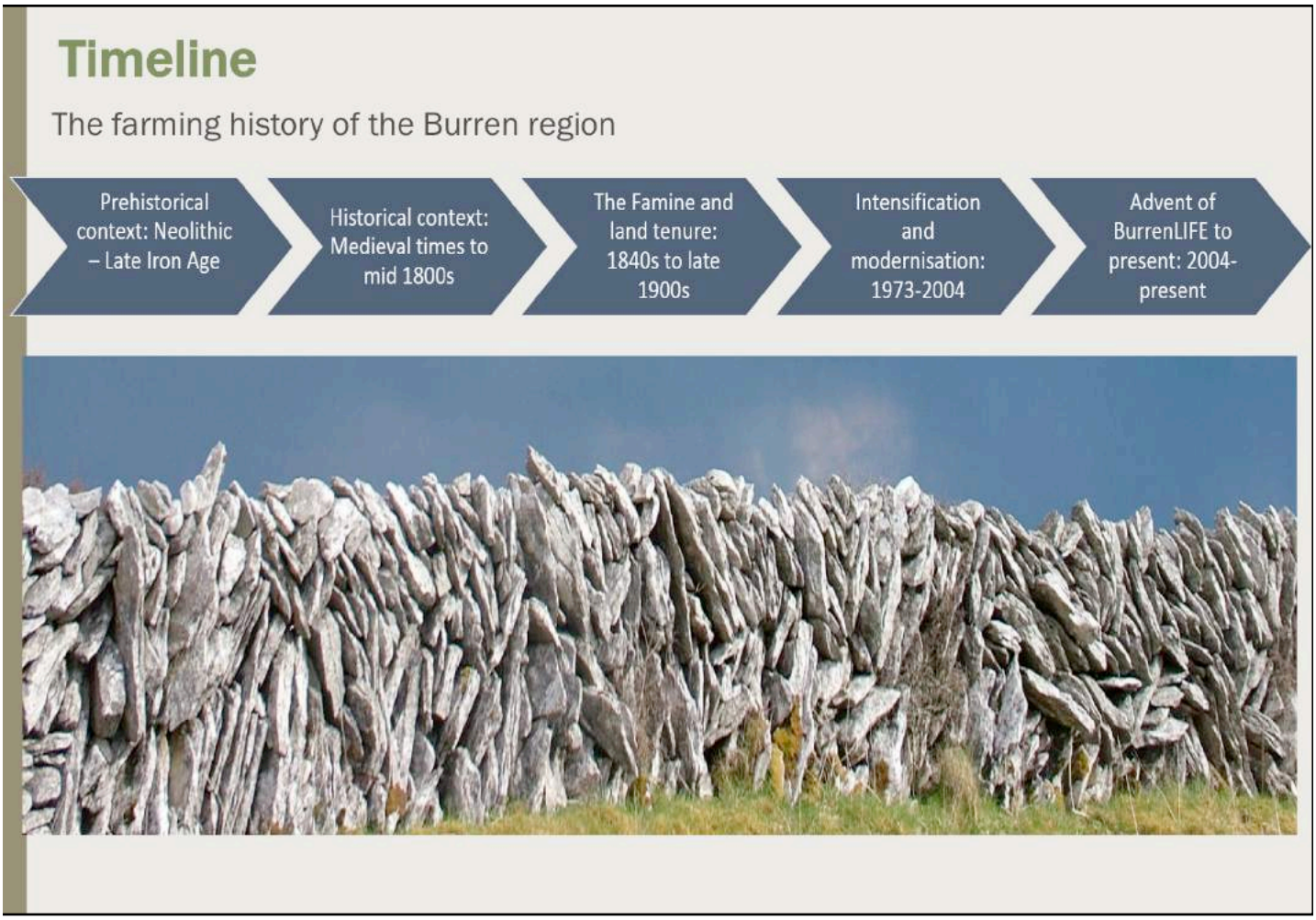


Many others – including the characteristic single stone wall – date from more recent times, in particular the past 200 years. These walls perform important agricultural functions enclosing parcels or forming characterstic shelter walls (T-shaped structure to protect the animals from prevailing winds). They also mark townland boundaries. Many of these stone structures have fallen into disrepair due to the high labour required for their maintenance

Farming activity in the Burren has been moulded by the very individual limitations and strengths of the unique landscape, as is reflected in the evolution of practices such as winterage, herding and physical features such as rainwater troughs and shelter walls to name but a few. However, the agricultural tradition that contributed to the creation and maintenance of such features, and is reflected in them, is seriously threatened by changes in agriculture which have served to render many of these traditions functionally and economically obsolete. In much the same sense as some species-rich grasslands have been reclaimed and/or fertilised to produce uniform swards, so too has much of the diversity in farming activity succumbed to the increasing specialisation and intensification in the agricultural sector threatening the HNV of the landscape.

UNESCO Global Geoparks are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education and sustainable development. A UNESCO Global Geopark uses its geological heritage, in connection with all other aspects of the area's natural and cultural heritage, to enhance awareness and understanding of key issues facing society (UNESCO, 2017).

The EDPA is a prestigious international award granted since 1965 by the Committee of Ministers of the Council of Europe. It recognises natural and semi-natural areas and landscapes of exceptional European importance for the preservation of biological, geological and landscape diversity and which are managed in an exemplary way (Council of Europe, 2017).



In terms of telling the story of the Burren over time, we have an exceptionally well preserved prehistoric record in stone, supplemented by a strong written record including the Annals of the Four Masters which recorded information from as far back as the early Christian Period, and including the superb record of Hely Dutton and his Agricultural Census of County Clare in 1808. These written records tell a fascinating story, from the Mediaval Period when the Burren contained vast sheep walks owned by the landed classes, to the unspeakable tragedy of the Famine when the land and its people were laid bare.

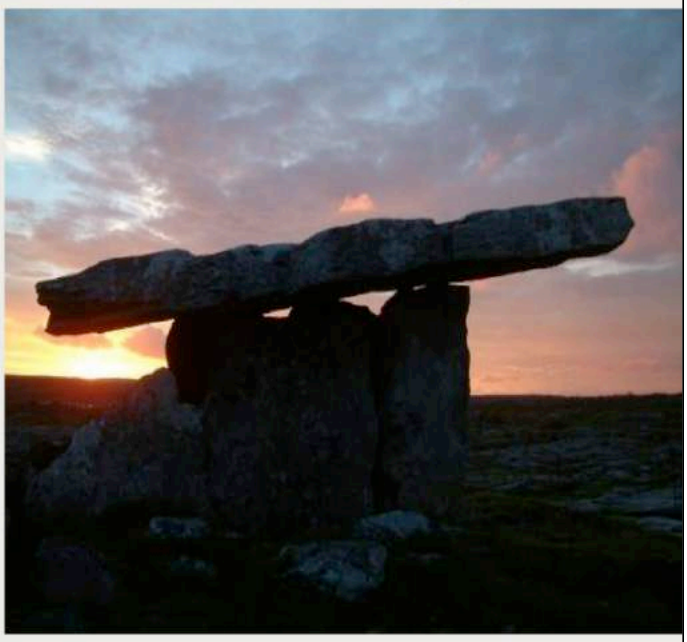
There are a number of significant time periods in the history of the Burren, each of which influenced the landscape we see today. Times of exploit were often followed by lulls which allowed the natural resources to recover. The development of farming was one of the most significant events, particularly in the Bronze Age which saw a significant reduction in woodland cover in the region. This was followed by a period of recovery during the Iron Age lull. Similarly, the early 1800's resulted in an increased pressure on the landscape with the Famine in the 1840's forcing the exploitation of any available natural resource to feed desperate people. This was also followed by a lull which allowed the landscape to recover and resulted in more sustainable agriculture for a time.

From the early 20th century until Ireland's accession into the then European Economic Community (EEC) in 1973 advancements in agricultural technologies had a major influence on the region from the advent of the use of fertilisers to the increased mechanisation of farming systems. These advancements largely took place unchecked by national policies.

From 1973 onwards, the policies of the EEC influenced Irish farmer's decisions both nationally and in the Burren region. The increased exposure to the international marketplace and continuing advances in farmland technology all impacted farming practices in the area with much intensification and modernisation taking place. During this period, the designation of Natura 2000 sites and the advent of agri-environment schemes precipitated an unfavourable situation in the Burren region that was positively addressed through applied research initiatives that took place from 2004 onwards.

Prehistorical context: Neolithic – Late Iron Age (400BC-500AD)

The first evidence of farming activity in the Burren is from the early Neolithic period, around 6,000 years ago. An excavation of the Poulnabrone portal tomb (c. 3,800 BC) revealed the remains of up to 22 people who appear to have farmed cattle, sheep, goat and some cereals.



Poulnabrone Tomb in the central Burren dates from 3800BC and is the first known structure built by farmers in Ireland

During the early Neolithic, farming activity was of a small scale and transient nature characterised by sporadic clearances, followed by abandonment and subsequent regeneration of the woody vegetation.
Farming developed significantly during the late Neolithic and early Bronze Age, when a phase of more structured, and settled agricultural activity seems to have developed.
The presence of over seventy-five wedge tombs (almost 20% of the national total), and the high number of farm settlements (incl. stone walls) from this period in the Burren indicate a prospering agricultural-based economy.

Pollen records from the Neolithic-Bronze Age show an increase in the presence of grassland species at the expense of species typical of wooded habitats – a reflection of increased farming activity. Parts of the Burren at this time were quite intensively farmed. However, during what is known as the 'Iron Age Lull' (up to 500AD) this trend reversed, possibly as a result of a climactic downturn, and forest cover recovered significantly.

Historical context: Early Christian Period (500-1200AD)

At the beginning of the Early Christian Period (c. 500 AD) agriculture began to recover strongly. Early Christian communities such as the Cistercian monks introduced new crops and farming systems. Lowland areas in the Burren – hertofore neglected due to their wettish nature and more dense cover - began to be more intensively exploited, most likely to meet the needs of tillage and milk production that the uplands could not provide.

Huge number of circular enclosures known as Ring Forts were built during this time (6-900AD) by farming communities. This may reflect innovations in dairying such as butter and cheese production, allowing communities to store food year-round and improve nutritional levels, thereby releasing the human resources needed to build these massive structures. The increased value of the milk cow would also have warranted the construction of these forts to protect cattle from raiding parties. Cattle became the currency across Ireland at this time. Land was valued on the basis of the number of cows it supported. The number of cattle one owned was a measure of one's standing in society. Fines, rents, tributes and gifts were paid in cattle (Kelly, 1997). Tributes of beef cattle, cows, sheep, pigs and cloaks were paid to the kings of Ireland from the tribes of the Burren.

Historical context: Medieval Period (1200-1700AD)

The increasing levels of agricultural productivity and prosperity of early Christian society in the Burren continued largely unabated into the medieval period. Pollen diagrams show increasing levels of arable farming and reduced levels of woodland cover. Dairying and sheep production levels also grew.

Written records from this time highlight the frequency of raids into the Burren, and the generous spoil secured - consisting mainly of herds of cattle and flocks of sheep. Warfare – particularly in the mid 17th century - and disease also impacted on society and farming.

Tower houses were built from the 14th to the mid-17th century by Anglo-Irish noblemen and Gaelic lord, soften featuring walled yards or 'bawns' employed 'for fear of theft, and on account of the ravages of wolves which had grown much in numbers while the wars engaged the attention of the people' (Ua Cróinín and Breen, 1996)

Towards the end of the 17th century, 'huge flocks of sheep numbering from 5,000 to 20,000 were commonly owned by the planters', while the stock of the peasantry was limited to 'generally a cow or two, some goats and six or eight small Irish sheep which they clip twice a year' (O'Donovan, 1940).

Historical Snapshot: 1641

In 1641 the book of Book of Survey and Distribution was published (Simington, 1641) - a survey of all lands within various baronies, prior to their distribution to the 'planted' classes.

In the Barony of the Burren 35 categories of land type were described, which in turn were broken down into 121 grades of different value. Under 'pasture' for instance, there are fourteen different classes, such as 'Dwarfwood pasture' and 'Rockie pasture'. These classes are further differentiated into 69 subdivisions based on profitability, such as 'Rockie pasture 1/3 profit', 'Rockie pasture 1/8 profit', etc. This shows the variation in habitats, and most likely farming activity, across the Burren at this time, prior to the redistribution of land to the settlers, a redistribution that was to last until the early 1900s, 250 years later.

A record by a traveller named Dineley, describes the Burren in 1681: 'it consists of one entire rock with here and there a little surface of earth, which raises earlier beef and mutton, though they allow no hay, than any land in this kingdom, and much sweeter by reason of the sweet herbs intermixed and distributed everywhere.'

Historical Snapshot: 1808

Hely Dutton's statistical survey of Clare (1808) describes the Burren as 'extremely rocky, but produces a herbage fit for sheep of middling size and short clothing wool, of which immense numbers are annually reared, and usually sold at the fair of Ballinasloe in October, and from thence drove into Leinster to be fattened at three years old; a small part feeds store bullocks, and a much smaller fattens them for Limerick or Cork market'. He estimates that nearly 10,000 acres of land is grazed by sheep.

Dutton describes the tenant farmers: 'A few farmers near towns hire their cows to their tenants, whose wives retail the milk; farmers generally have from four to eight; scarcely a cottier without a cow, some two, besides their succession'.

He also describes 'the limestone crags of Burrin … are, with some exceptions, devoted to the rearing of young cattle and sheep, and some so very rocky that four acres could not feed a sheep'. He notes that it is the 'custom of many graziers … to permit the grass to remain for feeding store cattle or sheep in winter, and frequently for the purpose of turning in cattle until their fattening round is ready, which in backward springs is of great value … very high prices are often paid …'

Historical context: Pre and post Famine (1700-1900AD)

The population of Ireland grew from 1 million in 1600 to 8.1 million in 1841, facilitated by the introduction of, and subsequent dependence on, the potato, first introduced in the late 1500's. The onset of potato blight in 1845 resulted in potato crop failures which persisted until 1849 depriving the poorest in Irish society of food. 1 million people died and over 1m emigrated.

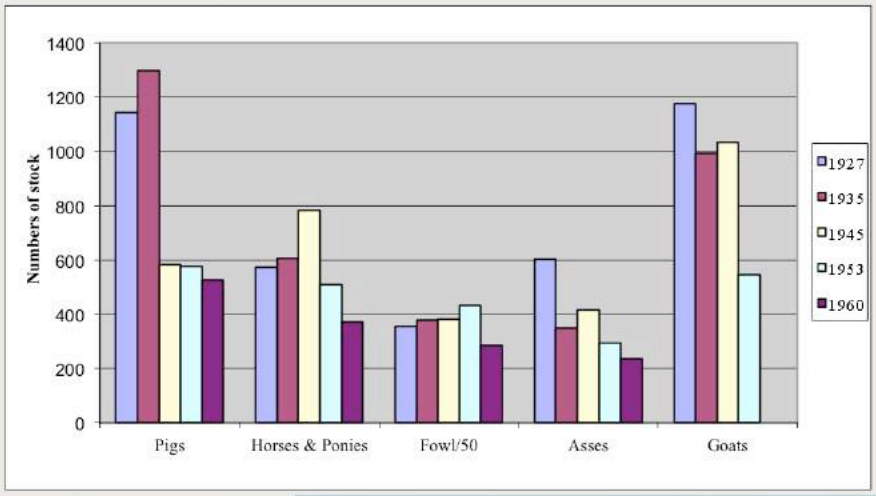
BRIDGET O'DONNEL AND CHILDREN.

Mitchell (1982) claims that around the time of the Famine 'every usable scrap of land was being turned over by spade, and no combustible material was left undisturbed'. Old stems of mountain avens, sods of earth and cow dung were common fuels in the Burren reflecting the absence of scrub at the time, as it had all been exhausted for fuel and as forage for goats.

However, in the fifty years following the Famine (1854-1904), the numbers of cattle and sheep in Ireland almost doubled, as the collapse in population facilitated the consolidation of the highly fragmented small holdings of pre-Famine times. Various land Acts in the late 19th century helped give some security of tenure to tenants. The Congested Districts Board was established in 1891 with the goal of creating holdings sufficient to support families in the poorest areas of the north-west and west of Ireland. They amalgamated and restructured many holdings.

By March 1919 the Congested Districts Board had resold around 585,000 acres (of some 23,000 holdings) in its area of operation, and together with the Land Commissioners and Estates Commissioners had sold 9.3 million acres of land (285,000 holdings). From the 1860s to 1915, most of the increase in livestock occurred with cattle, with numbers increasing from 3.5 million to 4.5 million (Huttman, 1972). Land reform finally gave Irish farmers control over the land they had been farming for many years previously.

20th Century



Over the course of the early 20th century, Burren farmers became increasingly exposed to international market forces – higher prices during the World Wars, lower prices in between due to Civil and Trade wars. Mixed farming systems, dominated by cattle and sheep with some tillage, but also other smaller stock (see graph of stock between 1927 and 1960) helped build a certain level of resilience.

Goat farming was an important source of additional income: the 'milk kid' – a goat kid reared on mothers milk – was a popular local delicacy up until the 1970s when most goat farming ceased.

Shorthorn cattle – first introduced in 1860 – were the dominant breed, considered excellent 'dual purpose' animals, good milkers and good beef cattle. In the 1960 census, 99% of cows kept were Shorthorn – though Angus and Hereford breeds were soon to grow increasingly popular.

The tradition of 'herding' whereby farmers with land in the Burren but living elsewhere employed local men to herd their livestock continued, with such herdsmen being granted a 'freedom' in exchange for their services. Such 'freedoms' included the free grazing for a defined number of the herder's own stock on the owners holding.

Modern Context: Accession to the EC (1973)

In 1973 Ireland joined the European Economic Community (EEC). This led to enormous changes in the agricultural sector of the Burren due to increasing exposure to the international marketplace, as well as the greater availability of innovative developments in the field of agricultural science (Dunford, 2001, 2016).

During the decades following Ireland's accession to the EEC in 1973, the relationship between Burren farmers and their landscape changed in a way that was unprecedented in terms of its speed, scale and impact. This was encouraged by a range of factors including the Common Agricultural Policy (CAP), which offered grant aids and subsidies designed to improve the lot of the Irish farmer, while also ensuring food security for the consumer.

Major changes were enabled by new agricultural technologies—cattle breeds, heavy machinery and agrochemicals—as well as technical support from farm advisors. Up to this time Ireland had one of the lowest levels of application of artificial fertilisers in Europe (O'Sullivan, 1968; Potter, 1997). Since the early 1970s, agriculture-related activities have led to habitat loss and change in Ireland. These activities include ploughing, reseeding, arterial and field drainage, commonage division, land reclamation, the substitution of silage-making for hay-making, increased use of fertilisers and increased nutrient inputs through supplementary feeding of increased stock numbers (Hickie *et al.*, 1999; Feehan, 2003). *The Irish Farmers Journal* even reported on an experiment to fertilise parts of the Burren via helicopter. All of this raised real concerns of nutrient leaching to oligotrophic lakes, turloughs and groundwater. Reclamation, increased fertiliser and slurry usage all resulted in a substantial increase in production. There was also an increase in the use of silage as supplementary feedstuff, produced in the lowlands but often fed-out on upland grasslands ('winterages').

Intensification and modernisation 1970-2000

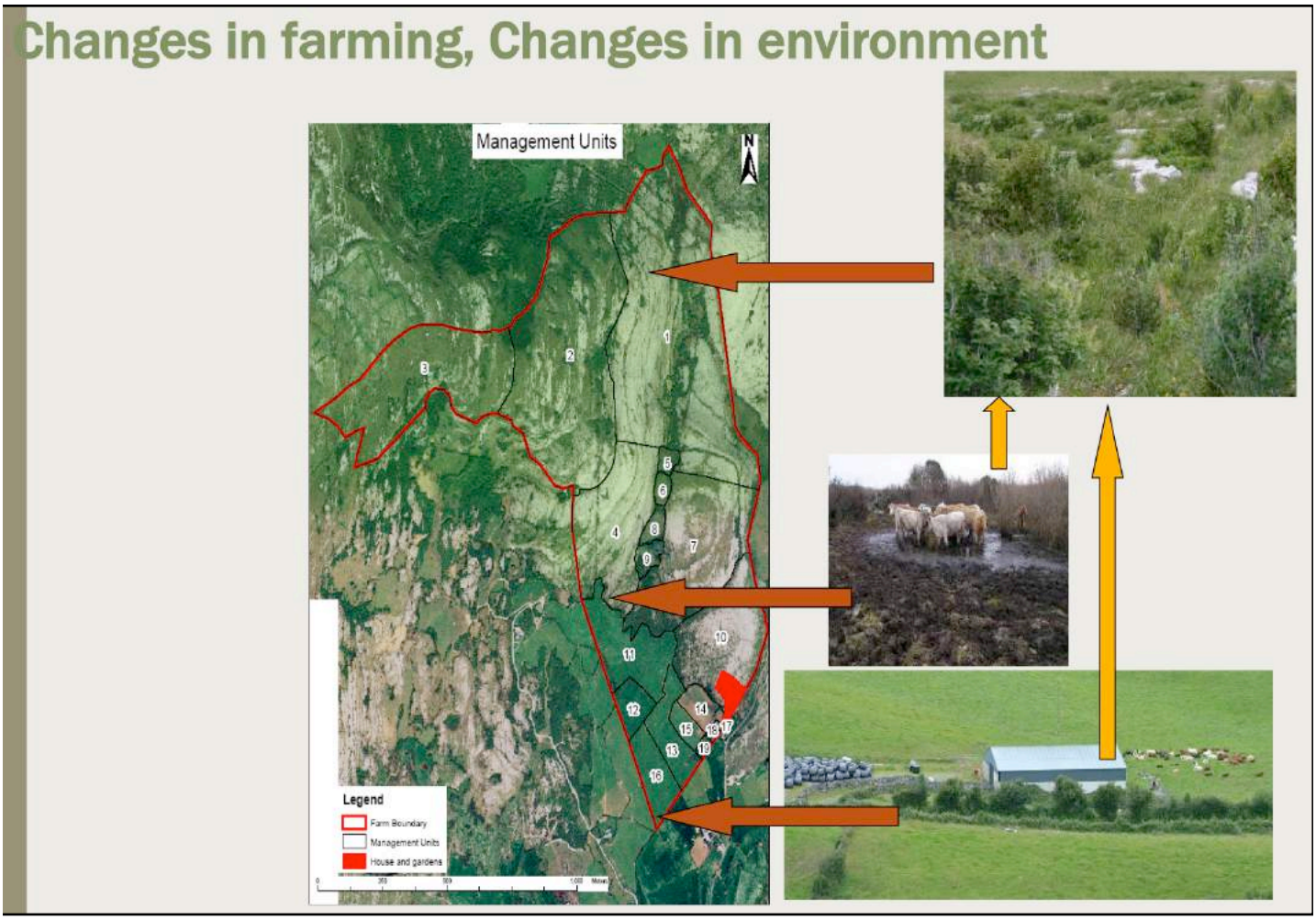
A rapid intensification of farming practices was largely driven by agricultural policies in the 1970s and 1980s such as the Farm Modernisation Scheme, the Western Drainage Scheme and the Headage Payment Scheme (Bleasdale and Sheehy Skeffington, 1992; Emerson and Gillmor, 1999; Hickie *et al.*, 1999; Feehan, 2003).

By 1986 arterial and field drainage schemes had funded 'improvement' of lands covering nearly one third of Ireland including areas of high scientific interest. For many farmers, these were welcome developments.

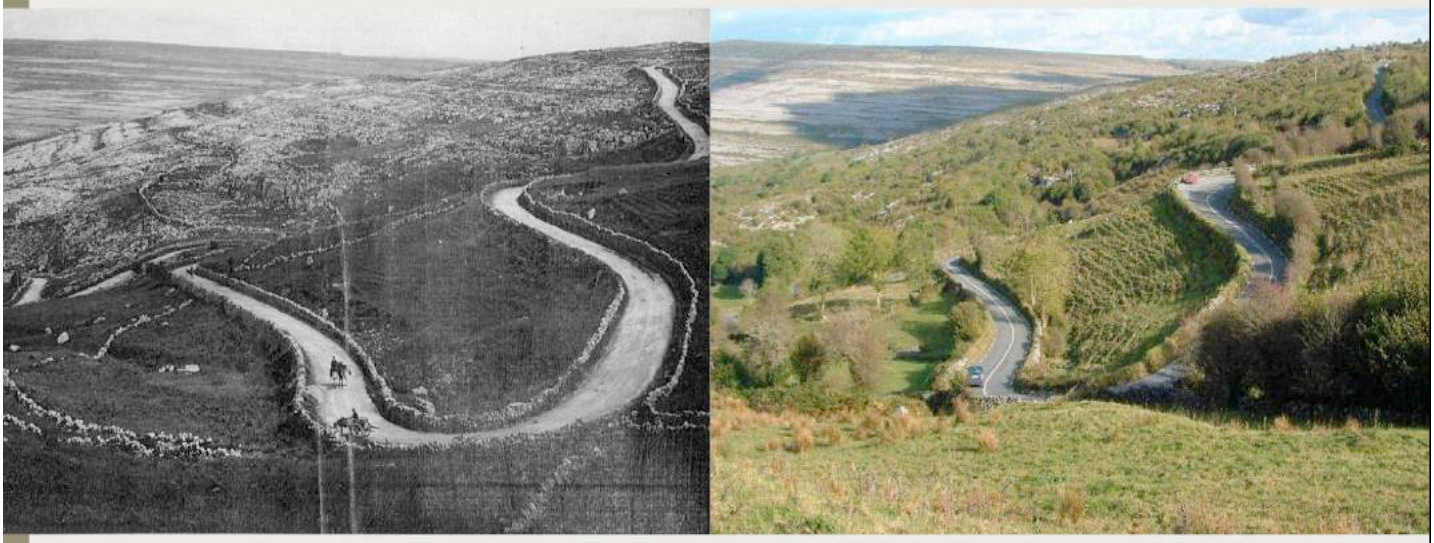
A 2001 study estimated that stocking levels in the Burren increased from 0.38LU/ha in 1970 to 0.66LU/ha in 2000, a 72.8 per cent jump over 30 years (Dunford, 2001).

Changes in Marketing and Dairy production also occurred.

The environmental impact of changing practices was very significant; extensive areas of rough grazing were 'reclaimed' and improved, silage production increased significantly (facilitated by higher nutrient inputs which impacted on local wetlands) and increasingly displaced the tradition of out wintering cattle on the hills.



While every farm in the Burren is unique, and equally so the management changes and challenges on each farm, in general the changes in farming and landscape over the past 4 decades is summarized in this slide of a 'typical' Burren farm. Increasing focus on lowland grasslands (fertilisers, slurry, machinery, silage, housing) may result in environmental damage such as reduced water quality while contributing to the undergrazing of species-rich uplands and the encroachment of scrub on these areas.



Corkscrew hill in the Burren in 1900 and 2000AD showing the changes in the landscape over time, mainly due to the reduction in farming levels on this area.

Natura 2000 Designations

Another EU policy that had major implications for the Burren was the Habitats and Species Directive (92/43/EEC). The EU Habitats Directive was transposed into Irish law in 1997, leading to the designation of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), a move that set out to, and succeeded in, halting significant land reclamation work in these areas.

The designation of land was not greeted positively by farmers, for a number of reasons. Farmers resented the erosion of their 'freedom to farm'. Also, in most cases, farmers in Ireland were officially notified of the designation through the post, receiving a list of activities on their land that would henceforth require ministerial consent.

The wholesale lack of consultation caused a lot of upset throughout the country. A report by the Consultative Committee on the Heritage of the Burren (2000) found that farmers were 'bewildered and some angered by the lack of proper consultation before their lands were lumbered with SAC categorisation.'
Land designated as a Natura 2000 site would not receive planning permission for building a house or developing a wind farm for example. This had an impact on some farmers. With so much of the Burren region designated as Special Area of Conservation, farmers in the area felt at a disadvantage compared with non-designated areas.

The designation of SACs was not greeted positively by farmers, for a number of reasons. In most cases, farmers in Ireland were officially notified of the SAC designation through the post, receiving a list of activities on their land that would henceforth require ministerial consent. The wholesale lack of consultation caused a lot of upset throughout the country. A report by the Consultative Committee on the Heritage of the Burren (2000) found that farmers were 'bewildered and some angered by the lack of proper consultation before their lands were lumbered with SAC categorisation.' O'Rourke (2003) described the 'strong criticism' by local farmers of the 'top down autocratic approach' with 'no prior consultation with the landowners' and plans 'designed solely on "the best scientific grounds"'. The study goes on to say that 'Burren landowners frequently complained about their inability to contest the designation, because it can only be done on "scientific grounds"—which they feel puts them at a distinct disadvantage.' It is further noted that 'given the history of the land struggle in County Clare and throughout Ireland, the imposition of legally binding restrictions on how landowners use their land is naturally quite emotive, even if they are once more given some financial compensation.'

Agri-environment schemes

One of the biggest changes Irish agriculture following EU accession was the introduction of agri-environment schemes. The first Irish scheme was called the Rural Environment Protection Scheme (REPS). Through REPS, for the first time ever, farmers were being asked to move beyond their production-orientated mentality and carry out measures that were supposed to conserve the environment.

Changes in Burren farming. Clockwise from the top left, trackway damage due to increased use of heavy machinery, large slatter shed for housing cattle over winter, cattle eating silage over winter instead of foraging outside, impact of silage feeding outside on the Burren.

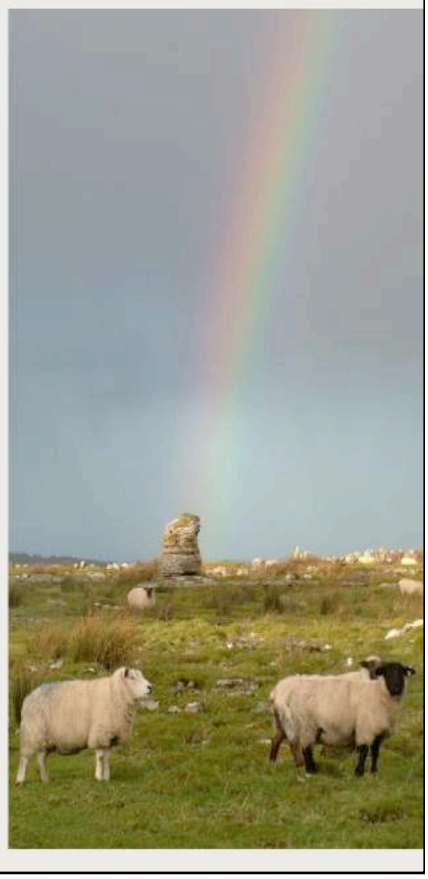
By 2007, almost 40% of the farmed land in Ireland was covered by REPS including most of the Burren. REPS was a single, national, prescription-based scheme with no accounting for regional variation.

While Burren farmers welcomed the income provided by REPS and its impact in 'tidying up' the area, they were unhappy with rules which limited their freedom to farm the and as they saw it. Severe restrictions on grazing periods and feeding systems were introduced which, farmers felt, didn't sufficiently accommodate the unique circumstances of the Burren. From an environmental perspective, REPS didn't significantly address key concerns around pollution or undergrazing.

End of a Millenium: the seeds of change are sown

As a result of SAC restrictions and REPS prescriptions, as well as other local issues, by the late 1990s there was much concern, negativity and division regarding the Burren and its management. Certainly the balance between farming and the Burren seemed to have been upset by a number of, mainly external, factors and, as a consequence, the Burren's environmental health had deteriorated significantly, with neither SAC designations nor REPS proving effective in addressing this.

Significantly, the Agreement also stated that 'research and monitoring... is deemed essential... include those of an environmental, agricultural, and socio-economic nature, and results should be used to modify the above-listed conditions' (Department of Agriculture & Food 1995). Thus began a new path for the Burren.



The public's perception of the role of farming in the Burren had also grown very negative. Farmers themselves were feeling very embattled and disrespected. Against this backdrop, the Burren Irish Farmers Association (IFA) was established. These were farmers from nine local parish branches of the IFA who disagreed with the perceived inappropriateness of the REPS guidelines in the Burren.

Consequently, the Burren IFA group negotiated the 'Conditions for the Conservation of the Burren to be applied under REPS' in 1995. This included a number of important concessions that made it possible, and more attractive, for Burren farmers to enrol in the scheme. This early success, including the group's ability to negotiate at high levels with public officials, instilled confidence and belief in the group and its potential.

2000 - Today: Steps towards success

Problems with Designations and REPS measures
1995

Research PhD: The Impact of Farming on the Burren
Teagasc & UCD
1998-2001

BurrenLIFE Project
NPWS, Teagasc, Burren IFA
2005-2010

Burren Farming for Conservation Programme
DAFM & NPWS
2010-2015

The Burren Programme
DAFM & NPWS
2016 - 2020

HNV Vision?

Step 1: Identifying the issues (1998-2001)

A number of research projects took place in the Burren during the early 2000s. These were instigated as a consequence of the introduction of new AES and SACs which raised many research questions

Key among them was a PhD thesis entitled 'The Impact of Agricultural Practices on the Natural Heritage of the Burren' which examined the relationship between farming and the landscape of the Burren over the previous six millennia, looking closely at traditional management practices (Dunford, 2001).

This research incorporated ecology, sociology and agriculture (both theoretical and applied) identified the key environmental challenges such as the limitations of existing management approaches, and also suggested some potential solutions.

In addition, a survey of local farmers was carried out to identify existing, and likely future, trends in Burren farming, to explore attitudes to the land and its management (with a particular focus on existing agri-environment schemes) and to identify issues that encouraged (or discouraged) farmers to engage with such programmes.

Importantly, it also helped to reframe the relationship between farming and the Burren in a much more positive light and identified areas of common ground for local and regional stakeholders.

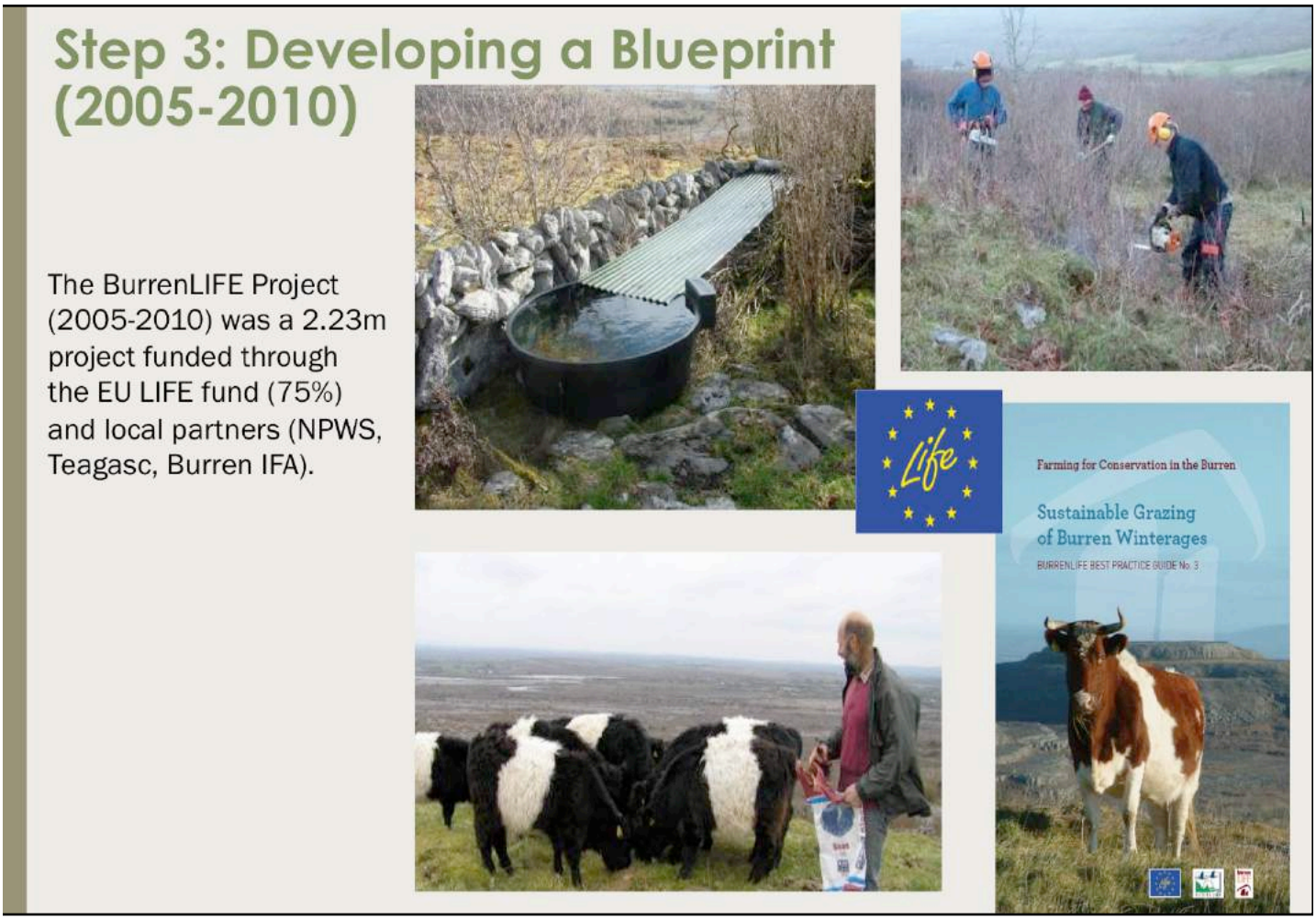
Step 2: Shaping a new, inclusive, narrative (2002-2004)

The findings of these research projects were published in he form of a book 'Farming in the Burren' which was launched in the Burren by the Minister for Agriculture. This book helped restore farmers' sense of pride in, and ownership of, their landscape.

The more inclusive story and emerging partnerships was key to the application for EU LIFE Nature funding in 2003.

The findings were also used to set up a website 'Burrenbeo' (the living Burren) which told the broader world about the importance of farming to the biodiversity and landscape of the Burren. Burrenbeo also began a number of local school and community educational initiatives which invested in farmers as Burren custodians. Burrenbeo Trust is now a major national ENGO focussing on 'connecting people with their place and its care'.

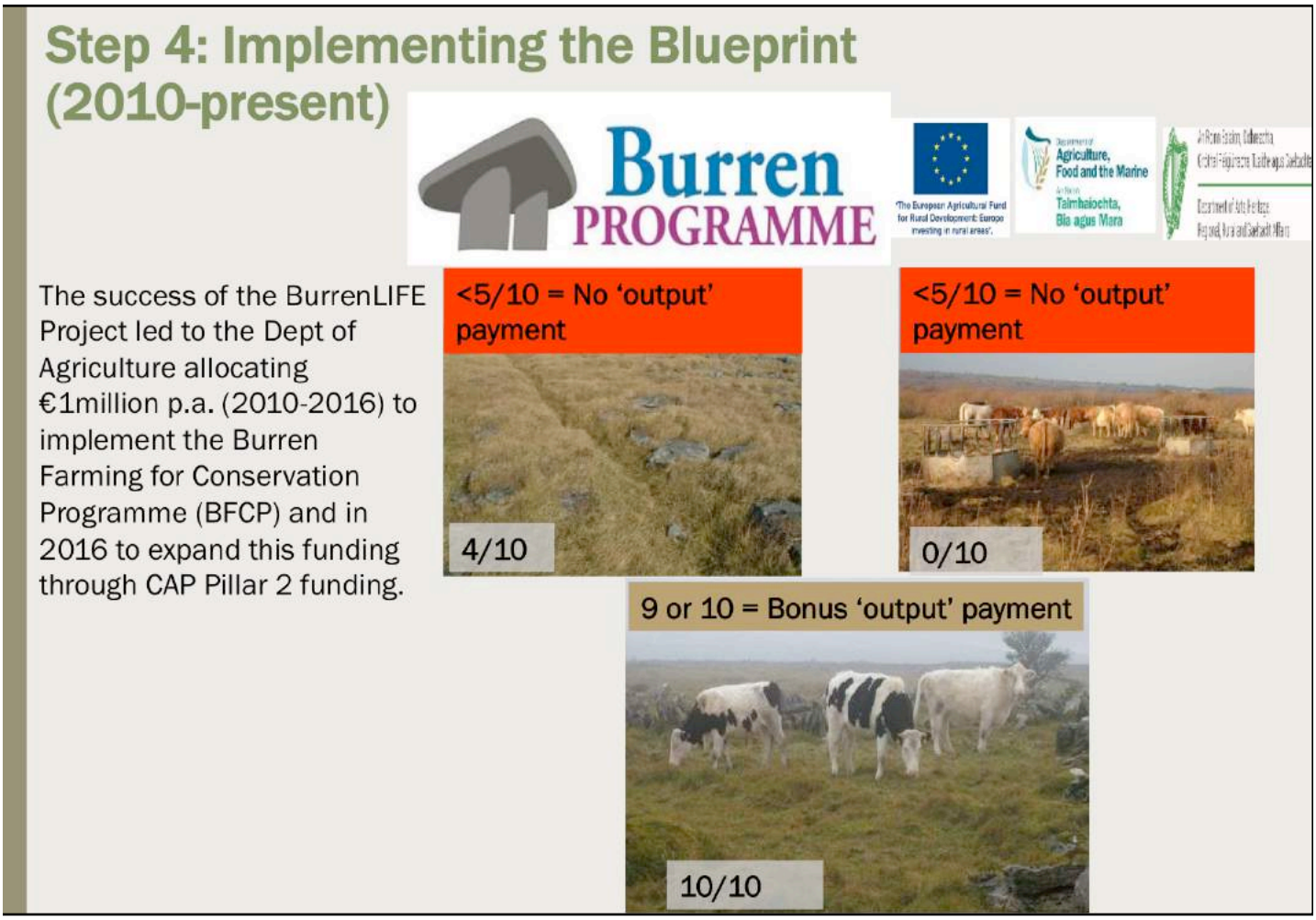
Following this, a successful application was made in 2003 for funding from the EU LIFE Nature fund (a fund dedicated to the sustainable management of SACs across Europe) for €2.23m. The National Parks and Wildlife Service (NPWS), Teagasc (the Irish agricultural advisory body) and the Burren Irish Farmers Association (IFA) participated as co-funders and key stakeholders. The project's objective was to develop a blueprint for the sustainable agricultural management of the Annex I habitats of the Burren.
Its approach was simple; to implement a range of management interventions across a selection of working farms in the Burren and to monitor the agricultural, economic and environmental impact of these interventions. To achieve this an ambitious programme, with a range of project actions, was developed. These included implementing best-known management practices on 2,000ha of the Burren.



The project worked on 20 pilot farms. On these farms, key management challenges were identified and potential solutions (mainly proposed by farmers) were tested and costed.

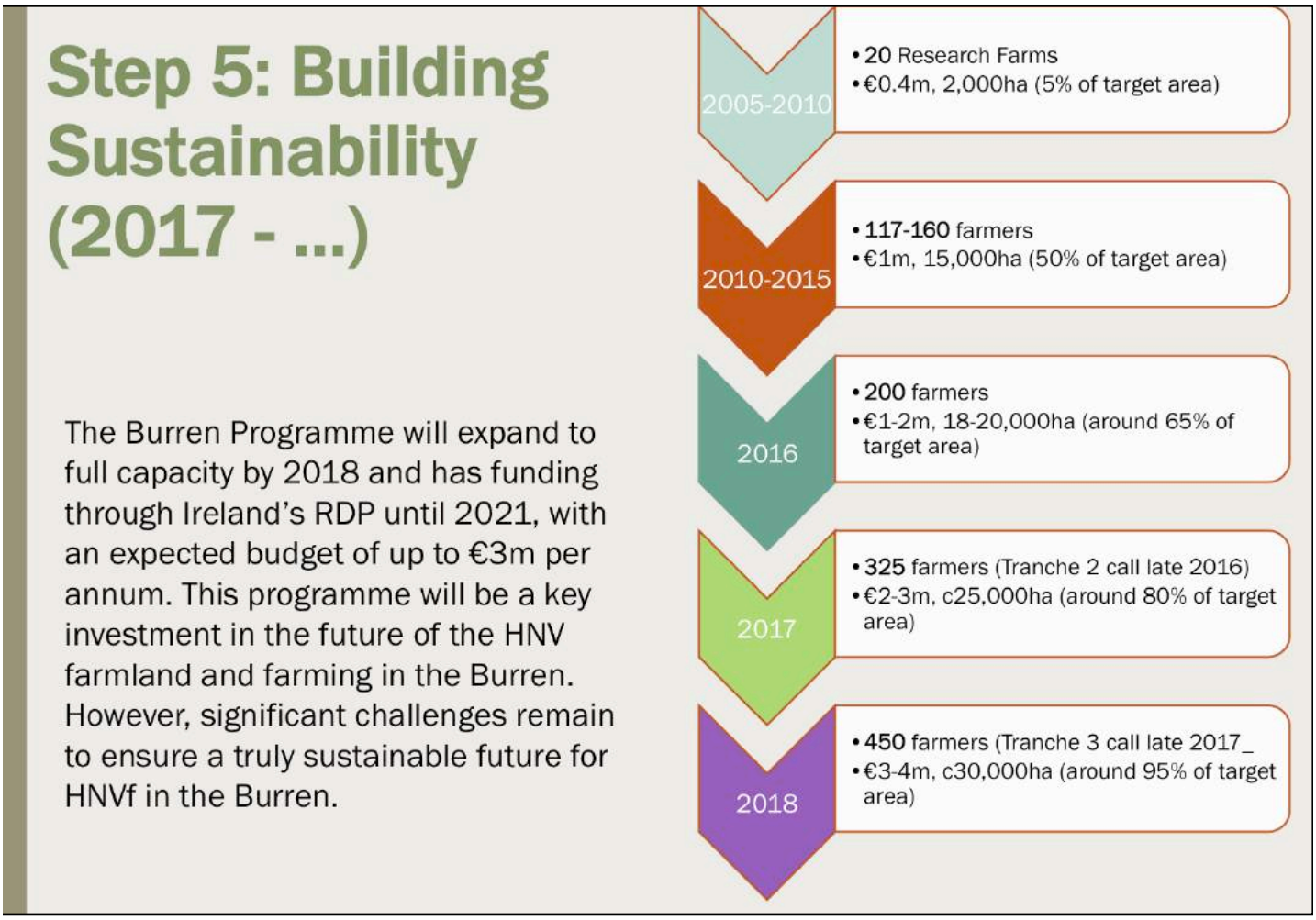
Key achievements of the project included the development of new cattle feeding systems, livestock watering facilities and scrub removal techniques

The final output of the project was a blueprint for the sustainable agricultural management of the Burren which included a range of actions, their impact and cost.



By 2018, an estimated 450 Burren farmers will partake in the Burren programme, covering 90% of the target area (Annex I habitat).

The BP is a 'Hybrid' AES whereby farmers are paid for project actions (on a co-funded basis) and also for project impact/results. The latter innovation, whereby fields are given an annual environmental health score which determines the payment for that field, has proven very impactful and attests to the success of the approach.



This future include:

Social: an ageing farming population with very few young farmers resulting in a loss of management knowledge and skill and insufficient labour to carry out required conservation actions.

Economic: Farming remains an unviable occupation for most farmers, even with additional funding provided by the Burren Programme. Farmers currently gain very little from tourism or added value gained from livestock sales.

Environmental: Notwithstanding the impact of the Burren programme, scrub continues to encroach onto the Burren's grasslands while on lowland areas there is continued, often damaging intensification (reclamation, nutrient input).

Scenario in the absence of local environmental initiatives (1/2)

In the absence of initiatives such as BurrenLIFE and the Burren Programme, Burren farm families would still continue to be guided in their land management by issues around financial returns and convenience (efficiency) – time and money in other words.

Time-wise, farmers would continue to specialise in suckler beef or drystock beef production and not diversify. The use of time saving technologies would continue to grow – slatted houses, fertilisers and slurry, silage, heavy machinery etc. As would the focus on the 'green land' areas of the farm to which these technologies best lend themselves.

More time would be spent on off-farm work, including tourism-related activity, with less time on labour intensive activities such as herding, wall repair, and scrub removal - all of which are critical to the maintenance of the HNV farmland areas.

Money-wise, farmers would be likely to, at best, maintain stocking levels but in many cases reduce them gradually. Silage would be the main winter fodder source, harvested by contractors and fed in houses or on the green land. There would continue to be a focus on continental cross animals, the progeny of which are in most demand at local markets. There will be minimal investment in HNV farmland areas other than to install vehicle tracks to improve convenience, though permission would be required for these works.

Most farmers would partake in the national Agri-Environment Scheme – GLAS – with the majority availing of options such as Natura, wall maintenance, Low-input Permanent pasture and Traditional Hay Meadow which will have minimal impact on the HNV areas of the farm and indeed have little effect on biodiversity in general (O hUallacháin *et al*, 2016). Increasing levels of environmental legislation and oversight, and the absence of any local support structure to assist with negotiating these issues, would provide a major disincentive to the carrying out of any management interventions on upland/HNV farmland areas. (continued)

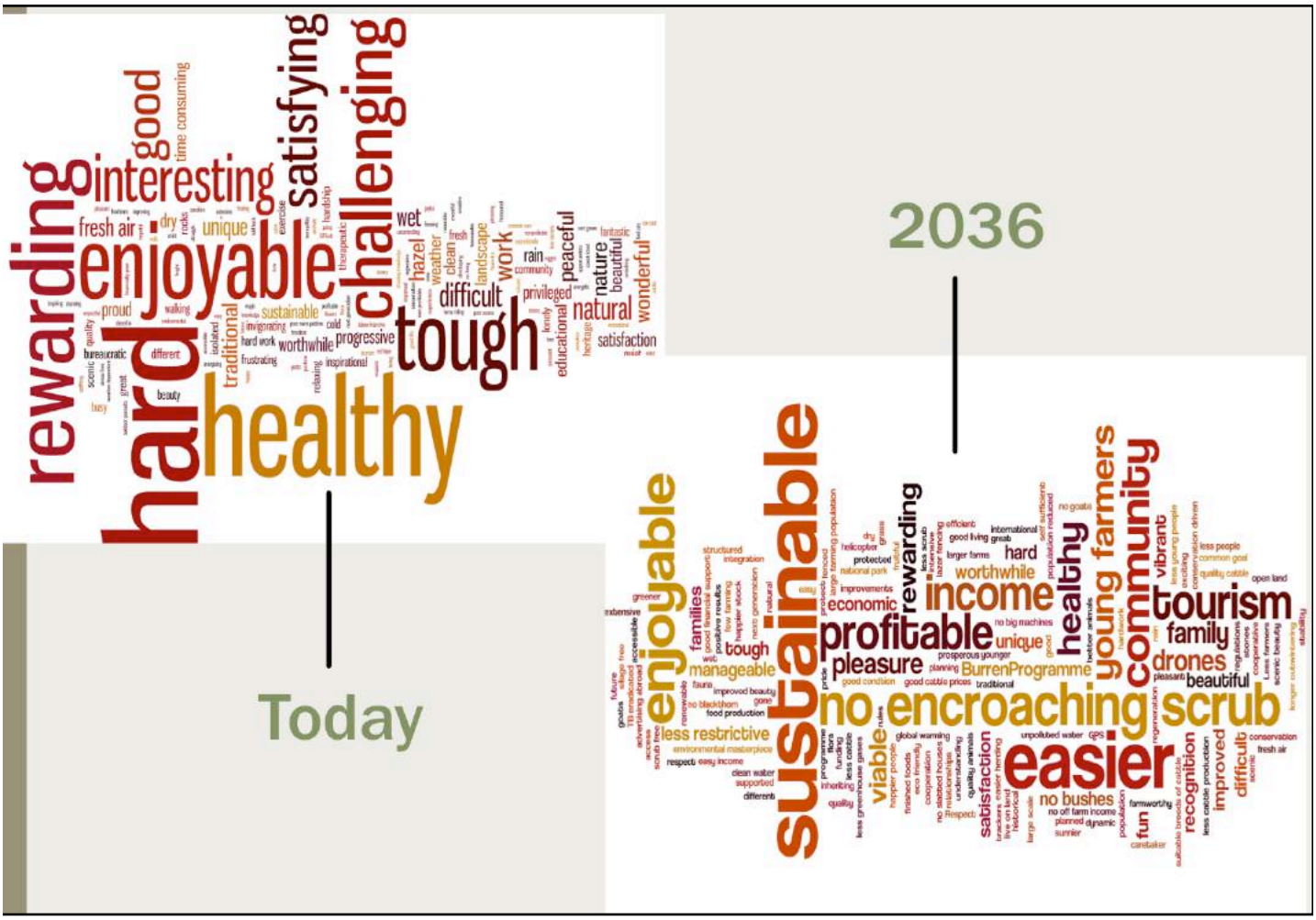
Scenario in the absence of local environmental initiatives (2/2)

Socially the number of farmers would continue to decline (and thus the average holding size increase gradually), the age profile worsen and the level of social isolation increase. Renting-out of land would continue but at relatively low levels.

The environmental impact of this continued withdrawal of activity from upland/HNV areas and increased activity on lowland/green land areas would be largely negative. Levels of grazing on HNV areas would reduce, resulting in increased litter and scrub levels and a general reduction in biodiversity (and impact negatively on built heritage features).

This may not be as noticeable on more exposed coastal areas but would be very pronounced in more sheltered inland sites. While the impact of a reduction in grazing on upland water sources (and soils) may be positive, the impact of increased use of fertilisers, silage and slurry on the lowlands would mean a worsening of water quality and soil health overall.

In the absence of Burren Programme, the environmental, social and economic health of the Burren would be likely to deteriorate. Grazing levels of the rough grasslands would decline further, resulting in continued species loss, while farming on the fertile lowlands would become more efficiency-driven and intensive. Traditional farming communities would continue to decline as farming becomes a smaller proportion of the farm family income and people access services outside of the region.



At a series of Burren Farmer Training Sessions in October 2016, 200 Burren farmers were asked to list 5 words to describe farming in the Burren today. Then they were asked to choose 5 words that would represent their vision for farming in 20 years time. These responses are aggregated into the word clouds above. The word sustainable for the future is noteworthy and is also reflected in terms such as profitable/rewarding (economic), community/young farmers (social) and no encroaching scrub (environmental).

The HNV vision for the Burren

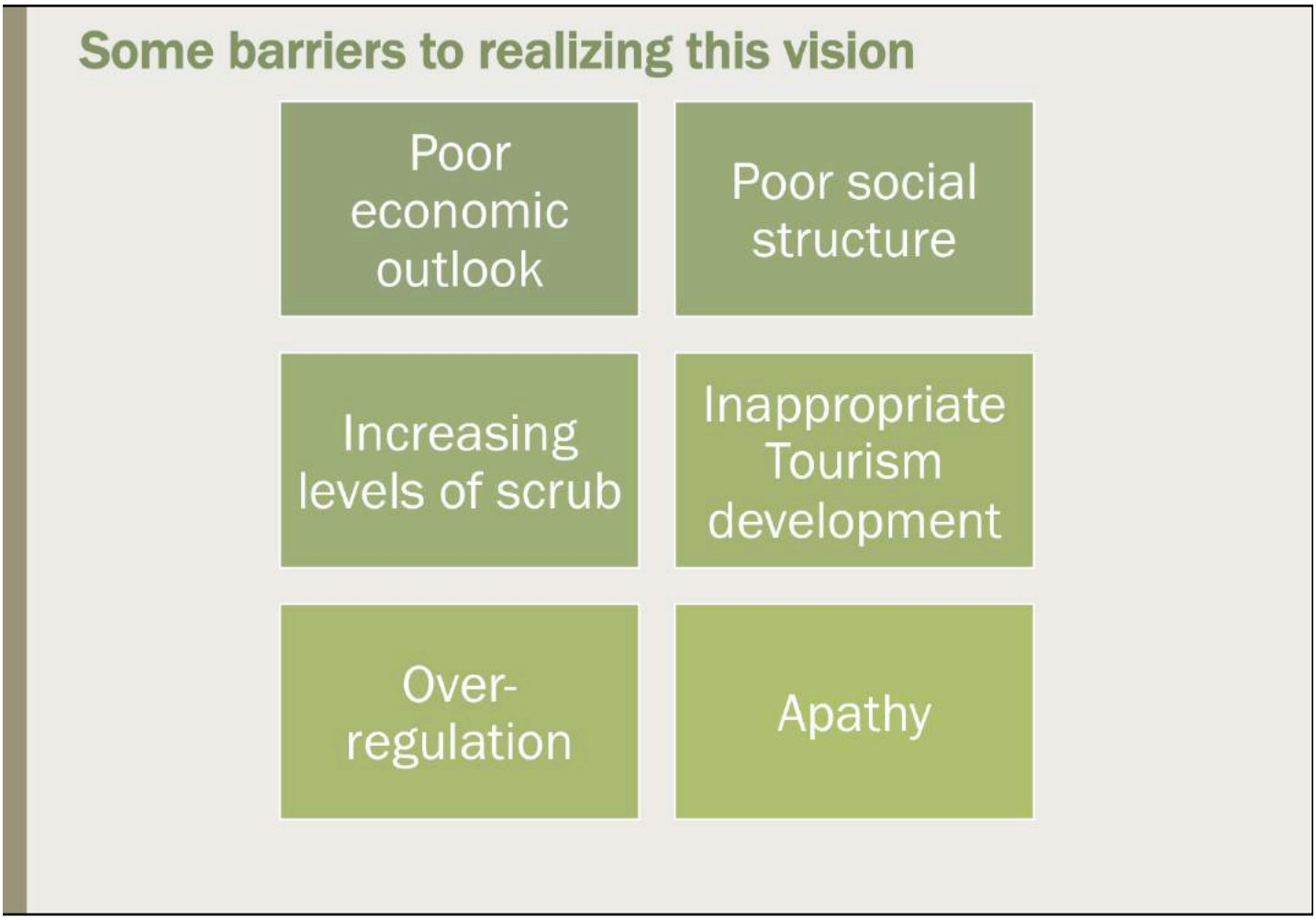
Burren HNV Vision

'Where Burren farmers, working in partnership with the wider community, earn a good living and enjoy a high quality of life as esteemed providers of a range of valuable public services based on an exceptional lansdcape.'

This vision was developed in collaboration with local farm leaders, while also drawing upon three previous studies: The Burren Charter, The Burren Farm Family Survey and Feedback from BFCP Training. It will be presented for discussion by a wider group of stakeholders at the HNV Innovation Seminar.

Some of the key Actors in realizing the HNV Vision

International	• EU • UNESCO • Council of Europe • HNV LINK, EFNCP, Europarc and other EU Networks
National	• Dept of Agriculture, Food and the Marine • National Parks and Wildlife Service • National Monuments Service • Teagasc (Farm Advisory Service)
Regional	• Clare County Council • Galway County Council • Leader Companies (Clare and Galway) • Collegess (Galway, Sligo and Limerick)
Local	• Burren Irish Farmers Association • Burren Programme • Burrenbeo Trust • Burren Ecotourism Network



All these barriers, altogether, call for innovative ways to overcome the difficulties. Life Burren project has shown how to overcome them.

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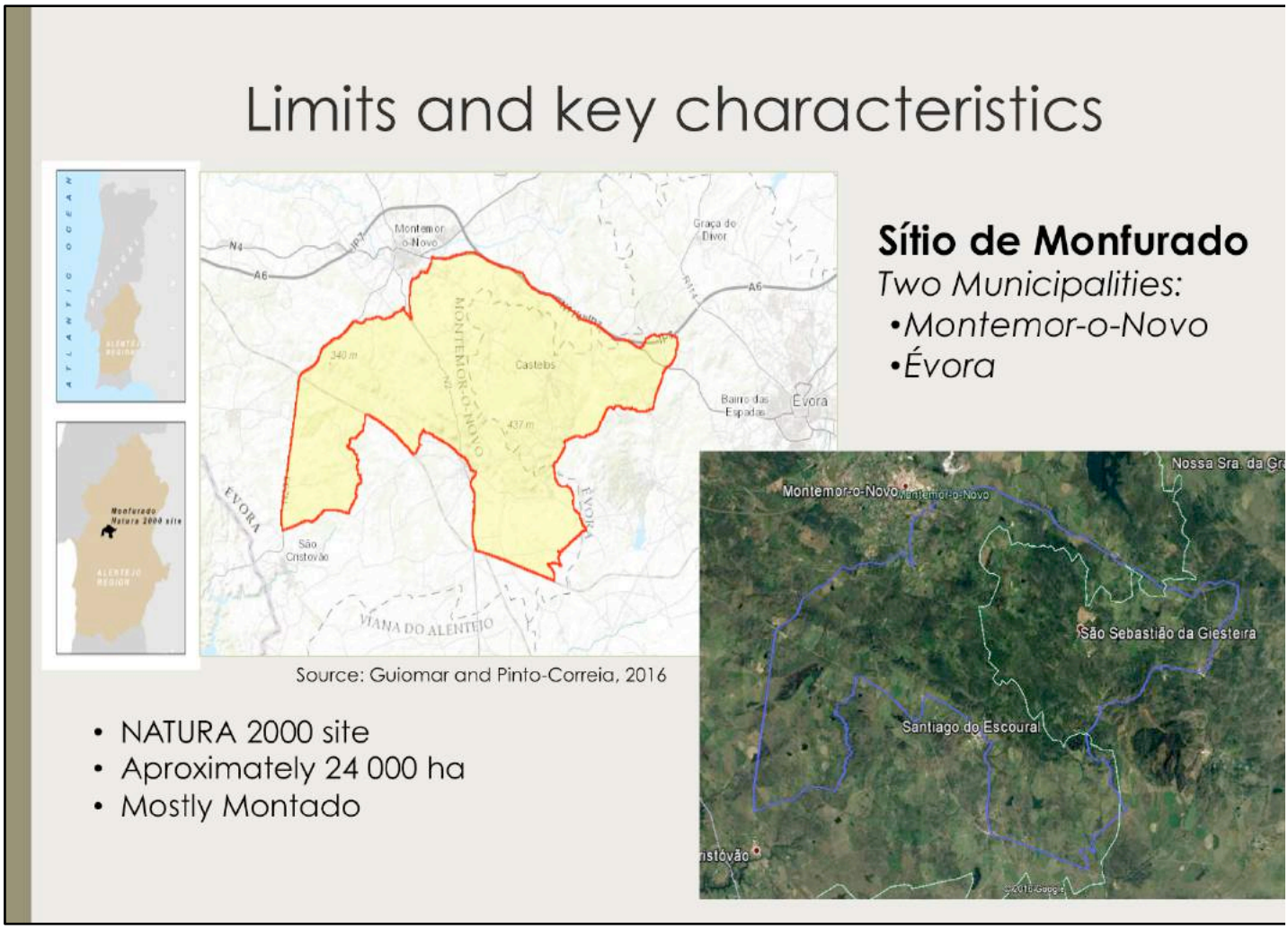
A thematic network on High Value Farming
Learning, Innovation & Knowledge

LEARNING AREA « SÍTIO DE MONFURADO » (Portugal)

A BASELINE ASSESSMENT

Authors: Maria Isabel Ferraz-de-Oliveira, Teresa Pinto-Correia
Date: June 2017

This project has received funding from the European Union Horizon 2020 research and innovations program under Grant Agreement No. 696391



Limits and key characteristics of the "Sítio de Monfurado"

The Sítio de Monfurado (SM) lies within two municipalities, Montemor-o-Novo and Évora. With about 20 km long and 15 km wide, it has clear boundaries both to the south and east, but more complex and blurred to the north and west.

The population density within the SM is low and concentrated in a few settlements.
The diverse landscape is composed of different types of land cover in patches of various sizes: dense Montado, the characteristic silvo-pastoral system, with mixed tree cover, dense cork oak forests in the steep slopes and deep valleys, and both open grazing areas and irrigated crop areas, in the plains. The Montado is dominant and composes a mosaic with the other landcover types. This mosaic supports a rich and specific biodiversity.

The landscape character in the Monfurado site is closely related to the dense Montado cover which dominates the SM. It is generally a High Nature Value (HNV) farming system. The property structure is composed by very large estates, except around towns and villages where small scale farms dominate.

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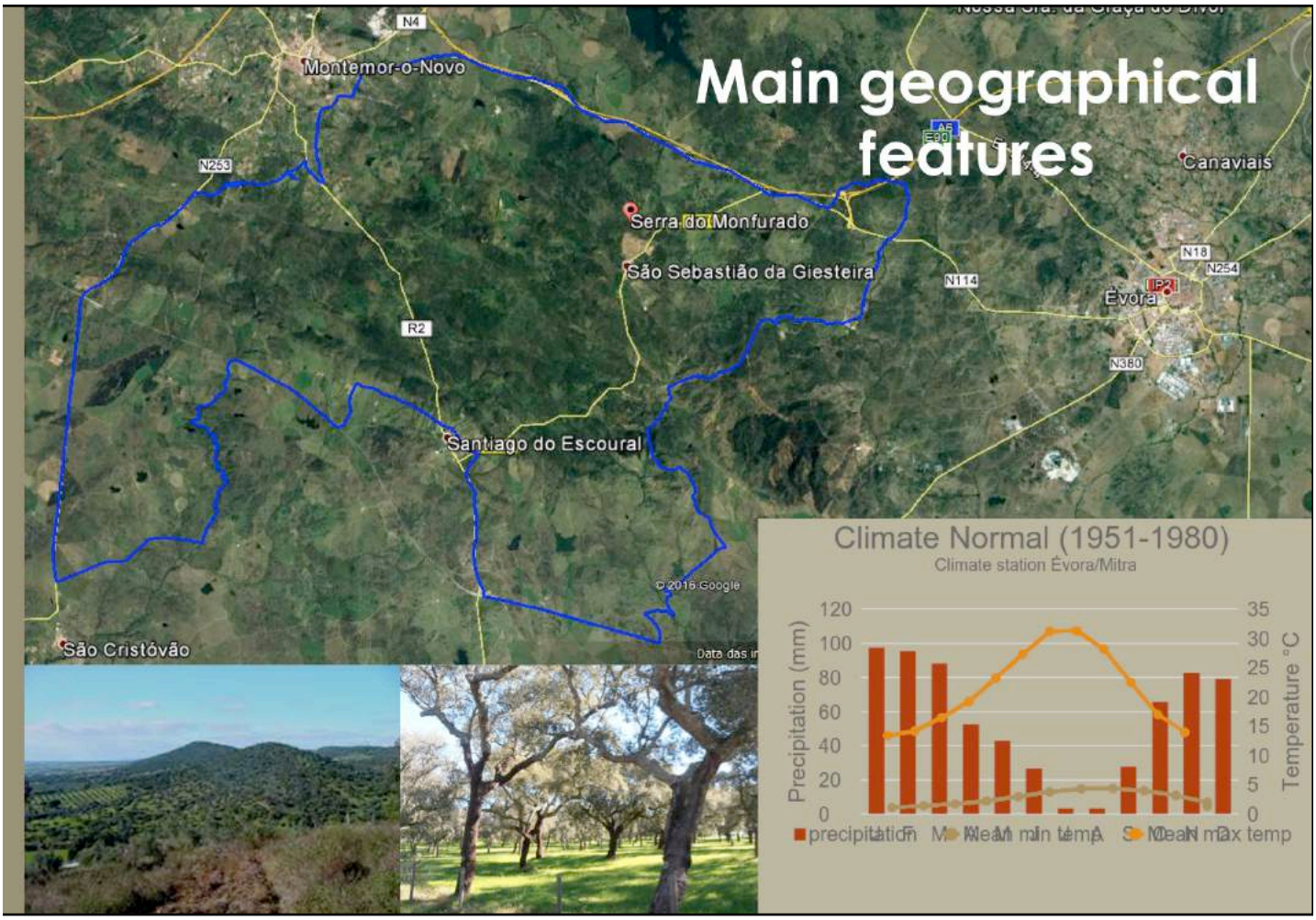

A portrait of Sítio de Monfurado (SM) Learning Area (LA)

The Sítio de Monfurado (SM) is a Natura 2000 site (PTCON0031) located in the Central Alentejo Region, in the peneplain Alentejana.

This territory (23,946.36 ha) has a diversified morphology ranging from 150 to 420 meters in altitude and a typical Mediterranean climate with dry and hot summers and cold and wet winters, reaching an annual rainfall of 900 mm, well above average for the surrounding region (Silva, 2008).

The SM diverse landscape is dominated by the Montado. The Montado is the silvo-pastoral system dominating in the region of Alentejo, and in particular in the Natura 2000 site of Monfurado - therefore the whole description of the site we hereby provide, is structured around the Montado - its characteristics and its trends of change and the respective drivers. At the SM the extensive Montados are of high tree density, well preserved and the tree stand is mostly dominated by Q. suber. There are, as well, *Q. rotundifólia* and mixed stands in a smaller extent which also include *Q. pyrenaica* and residually *Q. faginea* (ICNB, 2000).

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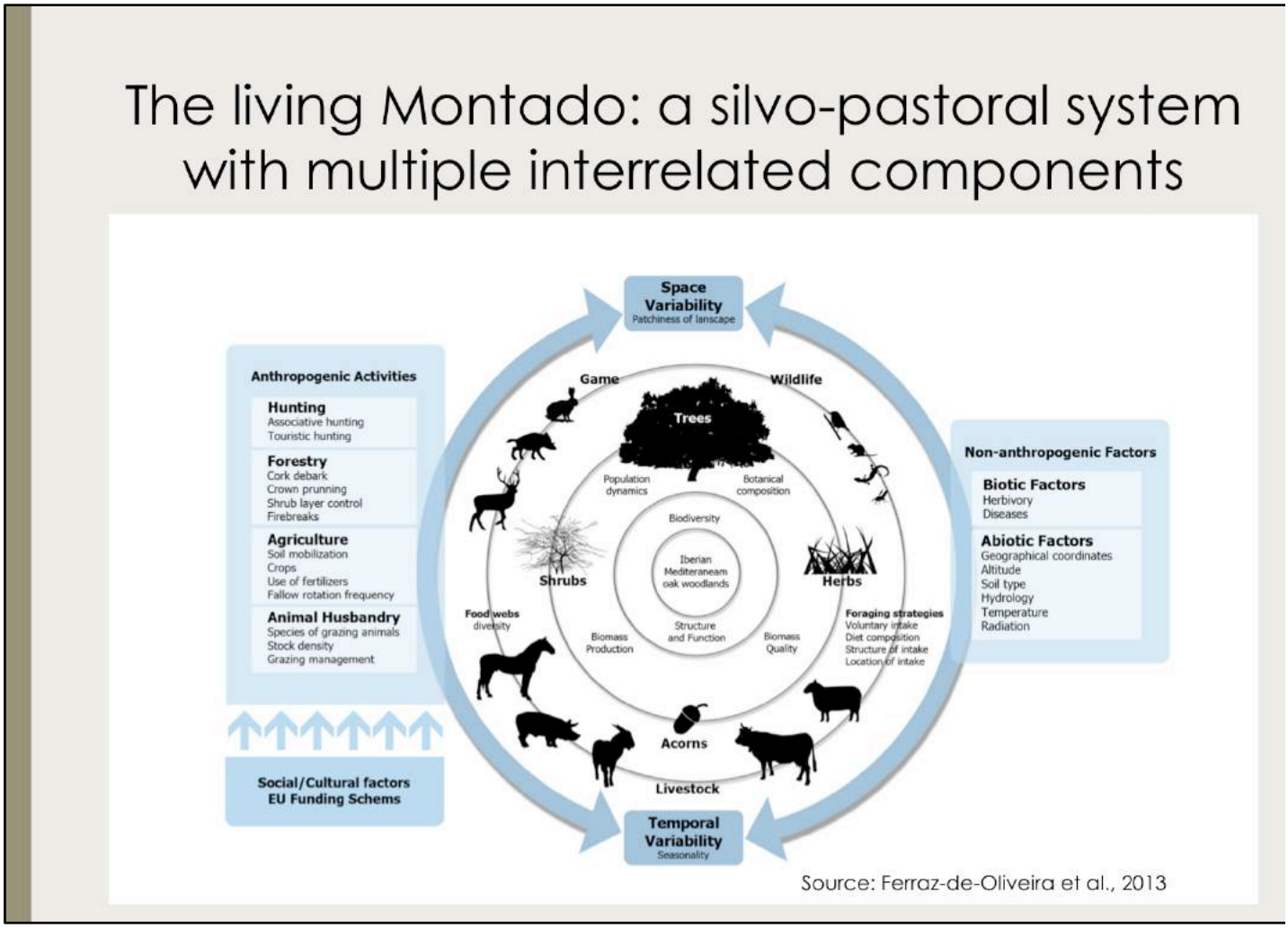
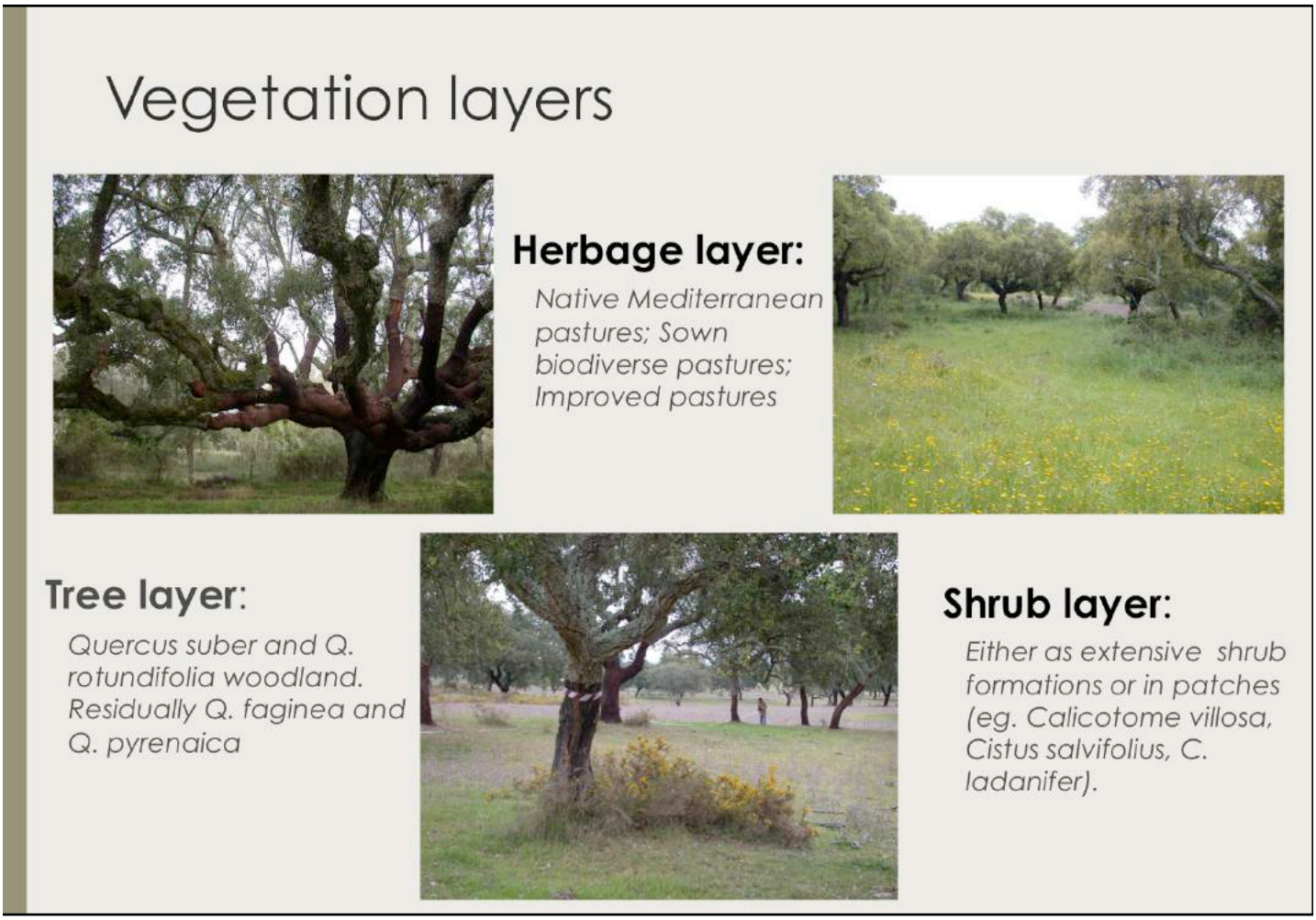


The Montado is a human shaped ecosystem system composed of complementary elements and activities. The open tree cover mostly composed of *Quercus rotundifolia* and *Quercus suber* in changing densities, provides forest products as wood for charcoal and cork. The trees provide shelter, both in the summer and in the winter, for the livestock grazing in the under cover. The undercover is composed of natural or cultivated pastures, combined with shrub in varied densities. The livestock grazing should be adapted to the carrying capacity of these pastures and animal grazing should allow for the natural regeneration of the tree cover, what happens naturally if not all young shoots are eaten or destroyed by the animals.

References:

Ferraz-de-Oliveira MI, Lamy E, Bugalho MN et al (2013) Assessing foraging strategies of herbivores in Mediterranean oak woodlands: a review of key issues and selected methodologies. Agrofor Syst 87:1421–1437.



Montados are typically structured in three vegetation layers:

- An open tree layer composed mostly in the LA by cork oaks with an average canopy cover greater than 50%.

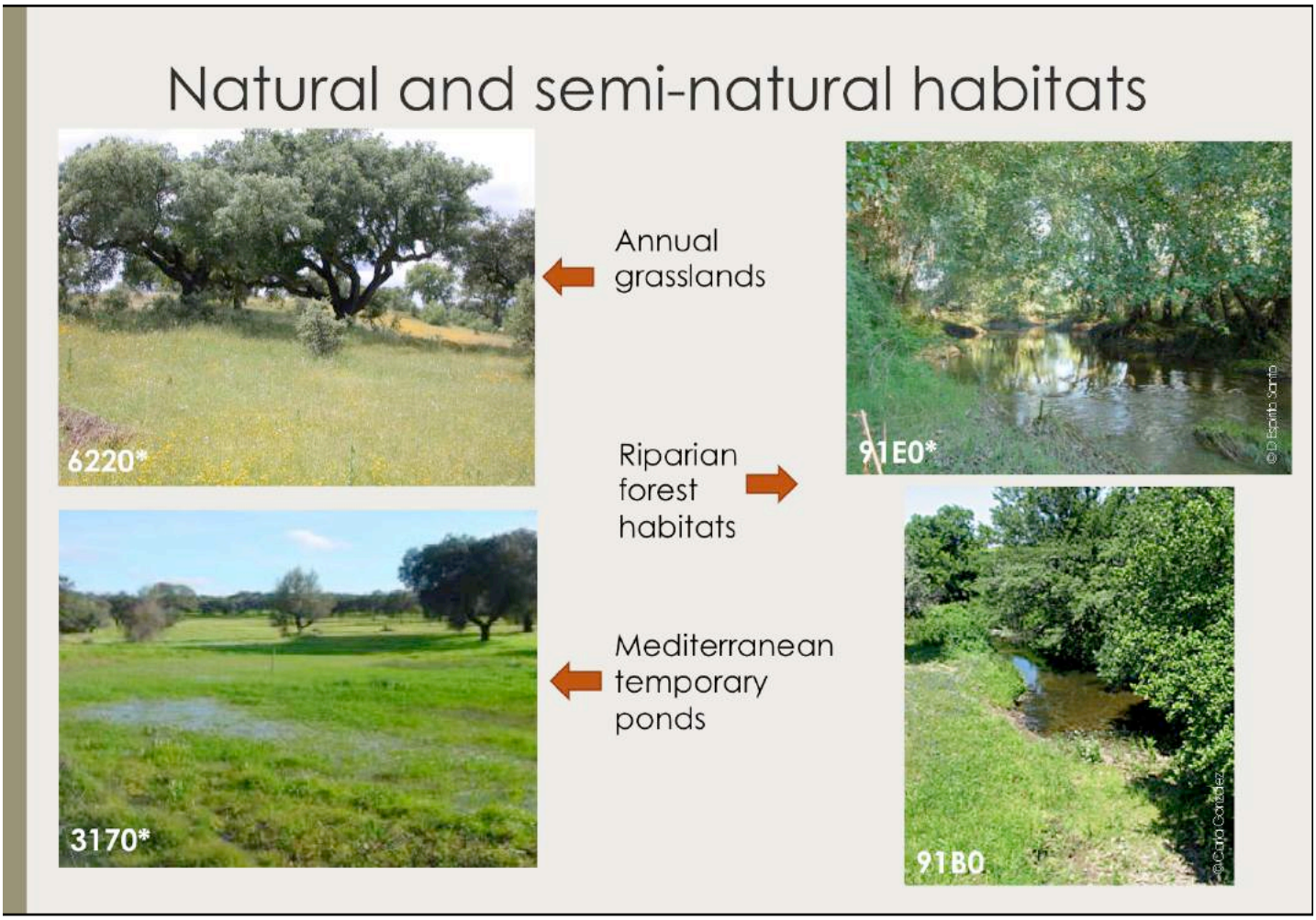
- An herbage layer composed by a large diversity of species, mostly annuals. Up to 135 different species of plants per 0,1ha have been reported in these ecosystem (Díaz-Villa et al. 2003). In many cases the pastures, within the LA are biodiverse sown pastures or improved pastures.

- A shrub layer which in the LA has a low cover, on average below 30% (Galantinho and Mira, 2009).

References:

Díaz-Villa MD, Marañón T, Arroyo J, Garrido B (2003) Soil seed bank and floristic diversity in a forest-grassland mosaic in southern Spain. J Veg Sci 14: 701-709. doi: 10.1111/j.1654-1103.2003.tb02202.x

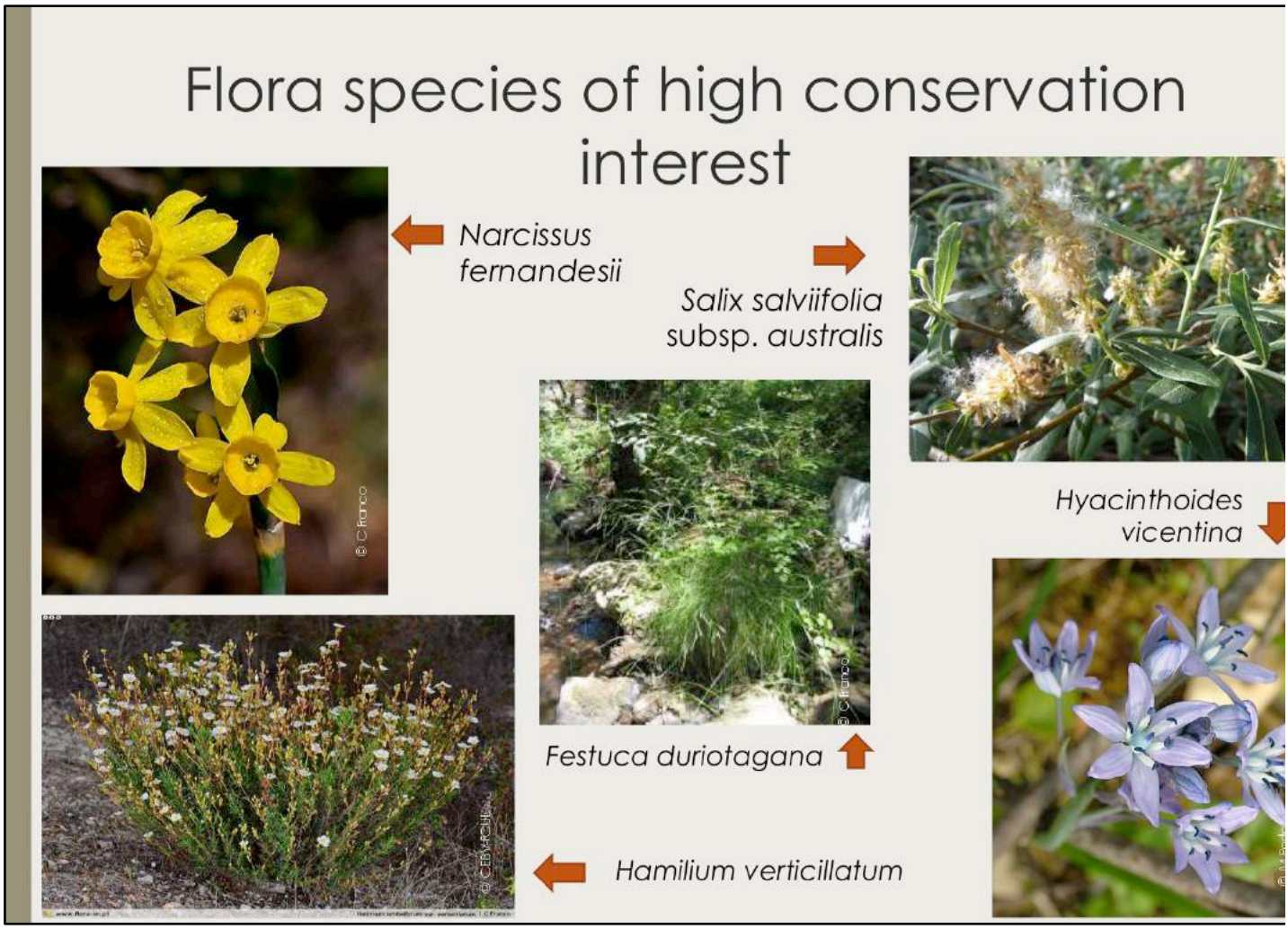
Galantinho, A. & Mira, A.(2009). The influence of human, livestock, and ecological features on the occurrence of genet (Genetta genetta): a case study on Mediterranean farmland, Ecological Research. 24: 671. doi: 10.1007/s11284-008-0538-5



The SM has a high diversity of natural and semi-natural habitats. Twenty one natural habitats from the "Habitats Directive" were identified, three of which are priority habitats:

6220*- Pseudo-steppe with grasses and annuals (*Thero-Brachypodietea)*
91E0*- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-padion, Alnion incanae, Salicion albae*)
3170*- Mediterranean temporary ponds

The good status of these habitats, in particular that of the "Annual grasslands" is directly dependent on the existence of an extensive grazing activity and a multifunctional management of the Montados. The conservation of Mediterranean temporary ponds in particular, is associated to extensive grazing by sheep, during summer, in the dry phase of the ponds, for the removal of dead plant biomass (personal communication C. Cruz).



The existence of some flora species of high conservation interest is related to the adoption of specific grazing practices. For example, *Hyacinthoides vicentina* benefits from extensive grazing practices and the absence of forage species while *Hamilium verticillatum* benefits from herding practices.

A number of important fauna species have their home in the LA, where the Montado plays an important role as their main feeding area. Some bat colonies such as mouse-big-bats (*Myotis myotis*) and the mourisca (*Rhinolophus mehelyi*) bat, as well as the Cabrera rat (*Microtus cabrerae)* are examples of such species which benefit from the existence of a mosaic landscape and of patches of open Montado.

The Sítio de Monfurado and surroundings have been inhabited since pre-historic times. The MS maintains an important historical patrimony which includes relevant paleolitic and neolitic edifications. There is a Cave, the Escoural cave, which remains the only grotto in Portugal where Upper Paleolithic rock art has been identified.

Most of this patrimony is located in private property and both conservation and access is an important issue that in some cases remains to be solved.

Further, many other buildings as churches and chapels, fountains and sources, and housing, demonstrate the presence of human communities along centuries.

Today this MS is also acknowledged due to the quality and integrity of its cultural landscape as well as for the traditional practices which are still used in the extensive production systems.

Human geography

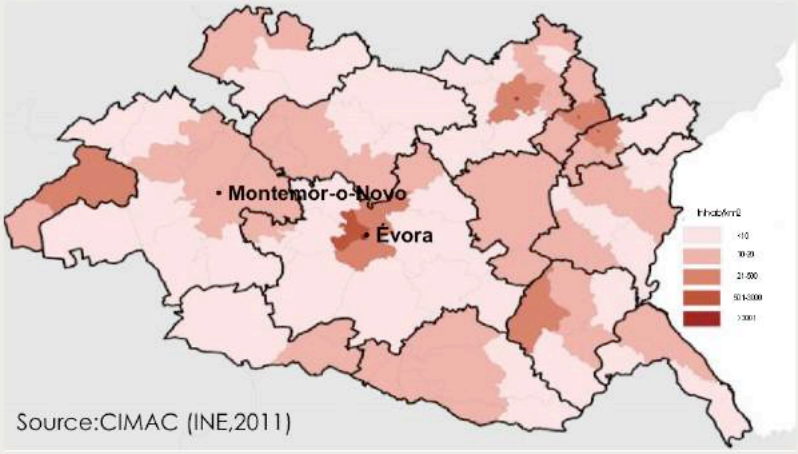
Territories	Resident population		
	2001	2010	2015
Portugal	10 362 722	10 573 100	10 358 076
Évora municipality	56 552	56 716	53 963
Montemor-o-Novo municipality	18 560	17 560	16 443

Source:PORDATA

The decrease in resident population in the rural areas is attenuated by the slight increase in the cities population

The Sítio de Monfurado, lying between Montemor-o-Novo and Évora has a very low population density: 6,1 inhabitants/km2

Population Density Alentejo Central NutsIII (2011)



Source:CIMAC (INE,2011)

Alentejo, the host region (NutsII) of our LA, is one of the most depopulated and aged regions of the country, considered as an economically and demographic less favoured area. The region of Alentejo has always been a region of low population density, with population highly concentrated in towns and villages.

Since the 60s of the last century most municipalities in Alentejo have suffered population decreases of 20-30% and Sítio de Monfurado is not an exception. This decrease trend in the resident population is less evident in the cities and more severe in the rural areas. This trend is present also in the LA and the surrounding towns, Montemor-o-Novo and Évora. The last data available for the resident population within the LA (2000) refers a total of 1469 individuals (ICNB, 2000).

Nevertheless, there are also trends of new inhabitants coming to the area, in a search for quality of life and well being. The proximity to the metropolitan area of Lisbon strongly adds to the attractiveness of the landscape. These inhabitants, however, tend to be more weekend visitors or retired people who do not take part in the economic activity in the area. They have though a role on the local economy.

The LA is well served in terms of road accesses, being easily accessible from the highway that connects Lisbon to Évora and the Spanish border (Badajoz). Regarding other public infrastructures as water, electricity and telecommunications, only the urban areas have this facilities, while farms within the rural area have autonomous systems for water supply and drainage of sewage.

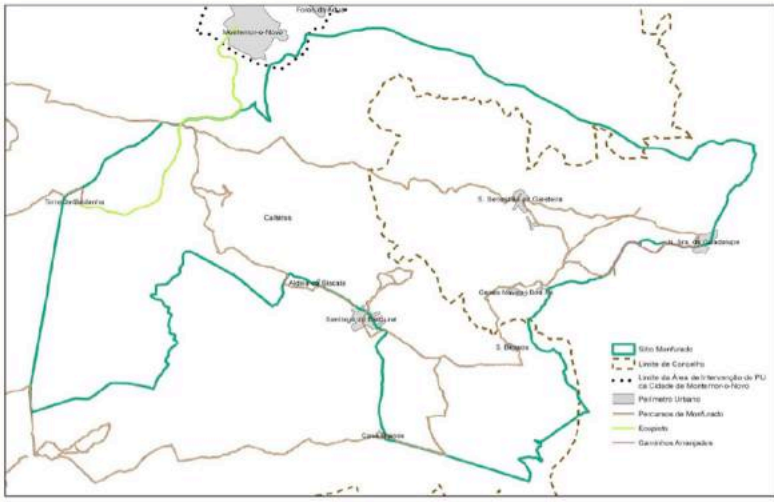
Alentejo Central (NutsIII) that hosts the Sítio de Monfurado, is considered an economical less favoured area within the Portuguese territory. Unemployment is relatively high and within the LA the main economic activities are related to the agro-sylvo-pastoral sector which is based in the Montado.

The main product of the *Quercus suber* is the cork. Wood and charcoal are by-products of both *Quercus suber* and *rotundifolia*, which still have a relevant role in the local economy, mainly in the surroundings of the small towns within the LA (S. Sebastião da Giesteira and Escoural).

Extensive animal production, mostly cattle is a very important economic activity that increased in the last decades within the LA, but without impact on the employment level, due to the progressive abandonment of the traditional grazing management practices with the presence of sheperds, in favour of the installation of fences.

Tourism and recreation are increasing and there are a few units of rural tourism in the SM, which did not exist ten years ago. Restaurants also benefit from tourism and recreational visitors. This sector may be expected to increase.

Trails and infrastructures for nature tourism in the LA



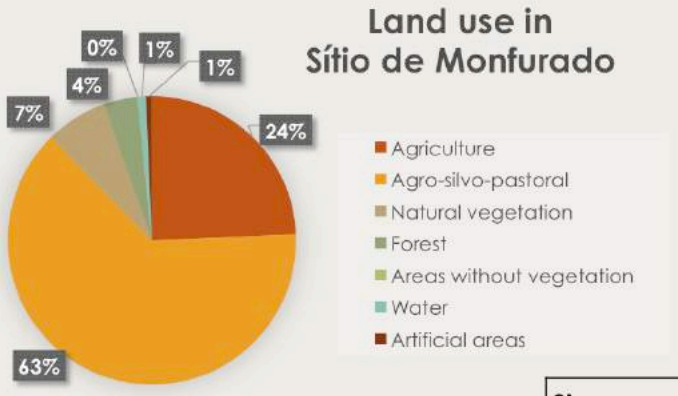
(source: PIERSM, 2010)

Trails and preserved paths within the LA

A number of trails for walkers and non motorized vehicles such as bikes and also horses have been established by the Municipalities of Montemor-o-Novo and Évora. Within the LA, 88km of environmental walkways are available for visitors and other users to experience the nature of the Montados. This paths also give access to some of the historical edifications found in Monfurado. The expansion of this trails is often impaired by the difficulties in access to private property (most of Monfurado) which, in most cases, is fenced and often locked.

The municipality of Montemor, following the LIFE program on Monfurado, established an interpretation center for the Sítio de Monfurado that provides information to the general public on the habitats and species found on the Natura 2000 Sítio de Monfurado.

Agriculture: key facts



Adapted from:PIERSM, 2010

- ***Larger farms are mostly agro-silvo-pastoral system: Montado***

- ***Smaller farms surround urban centers and have mostly agricultural use (e.g. olive groves, annual cultures)***

Farms' structure

Size range	Farms per class		Area per class	
ha	*Nº*	*%*	*ha*	*%*
0-5	509	68	673,024	2,07
5-10	47	6	322,875	0,99
10-20	29	4	401,039	1,23
20-100	54	7	3010,020	9,25
>100	110	15	28122,793	86,45
Total	749	100	32529,751	100

Adapted from: PIERSM, 2010

The economic activity which characterises the LA is by far related to the exploitation of the agro-silvo-pastoral system – Montado.

The main product from the trees is the **cork** extracted every 9 years and **wood and charcoal** as by-products with a much lower economic importance. Extensive animal production is also a very relevant economic activity with cattle (suckler cows) rearing in the front having replaced in a large extent **sheep** in the last decades.

Extensive **Alentejano** finishing pigs is mostly a seasonal activity (Montanheira, between October and February) based on the acorn and young grass production under the oak trees canopy.

Regarding agricultural production there are **some forage production** (hay, silage and haylage) some times irrigated mostly for feed supplementation of cattle during the pasture shortage period, usually from the end of summer until the next spring.

Hunting as an economic activity is present in the LA, however with deficient management practices resulting in reduced presence of the main species in the area (partridge and rabbit).

Other activities, with still a small expression in the LA are a result of the natural, environmental and cultural values of the region. These include honey, aromatic plants and mushroom production among others and recreation and leisure activities and supporting facilities. These are often the basis for small dimension touristic units mostly related to "**tourism** in the rural space", "agricultural tourism", "environmental routs" etc.

Main Agricultural Markets

Cork

- The cork oak bark is usually sold before being harvested.
- Harvesting takes place between the end of spring until mid summer, during the most active phase of cork growth.
- Cork transaction (commercialization) is mostly done between the producers and the industry or intermediaries through contracts.

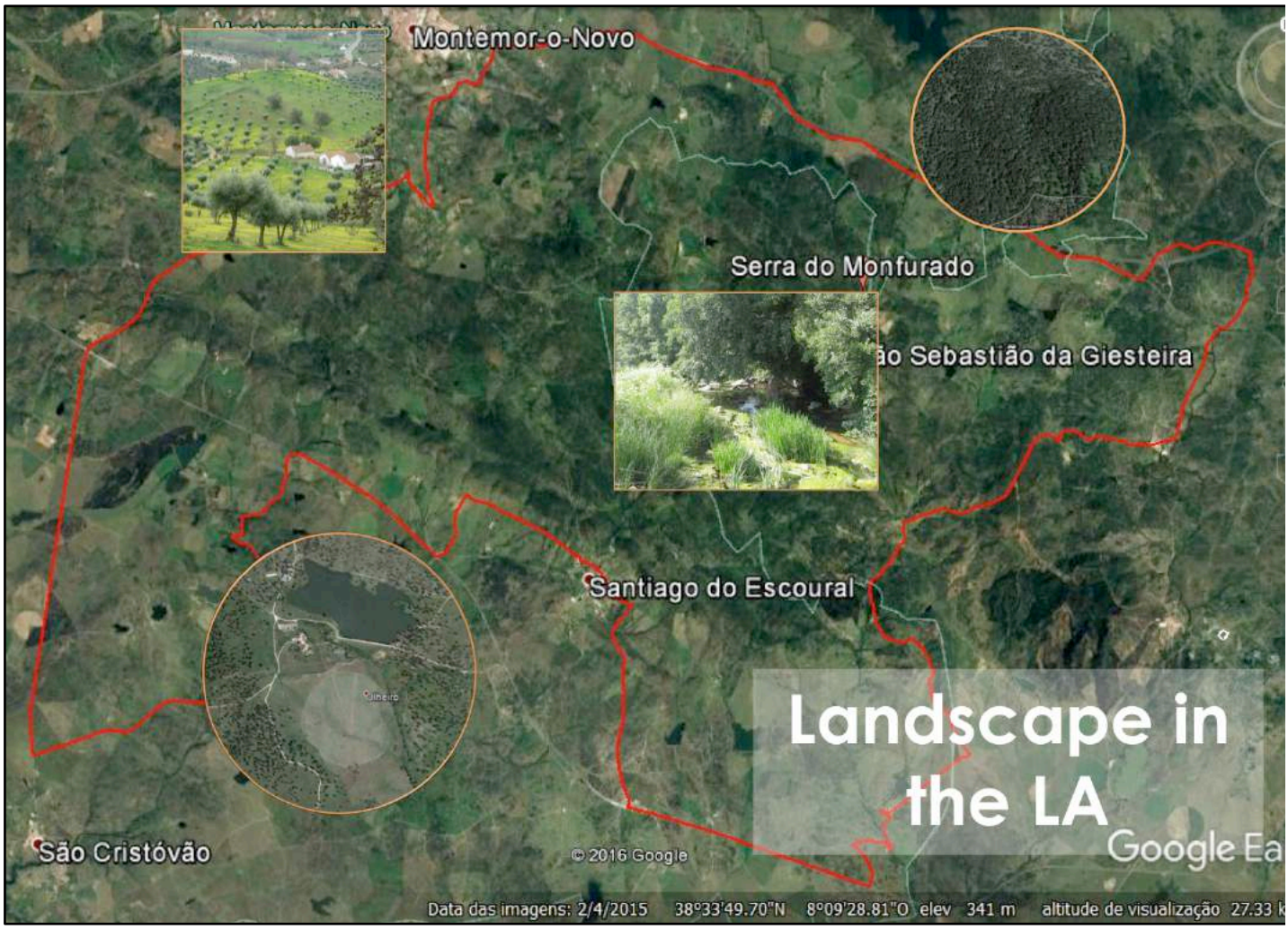
Livestock

- Most livestock (cattle and sheep) is traded through the regular auctions organized by APORMOR, an association of producers in Montemor.
- Other producers associations related to individual livestock breeds, also commercialise livestock and also certified meat and meat products (PDO).
- A very reduced number of farmers complete the production cycle and commercialize meat and meat products from their own farms with their own brand.

The market circuits for cork and also for livestock are well established. However, no distinctive brand exists for the Sítio de Monfurado cork and meat products.

Cattle is often commercialised by the producers as live animals through the weekly auctions organised by a producers association (APORMOR). In a smaller extent, producers associations of specific national breeds (Raça Alentejana and Mertolenga) that have their geographic production and also processing and preparation area that includes the LA, also commercialize their breeds using the PDO denomination.

Some farms are producing under certified organic farming, and selling their products as such.

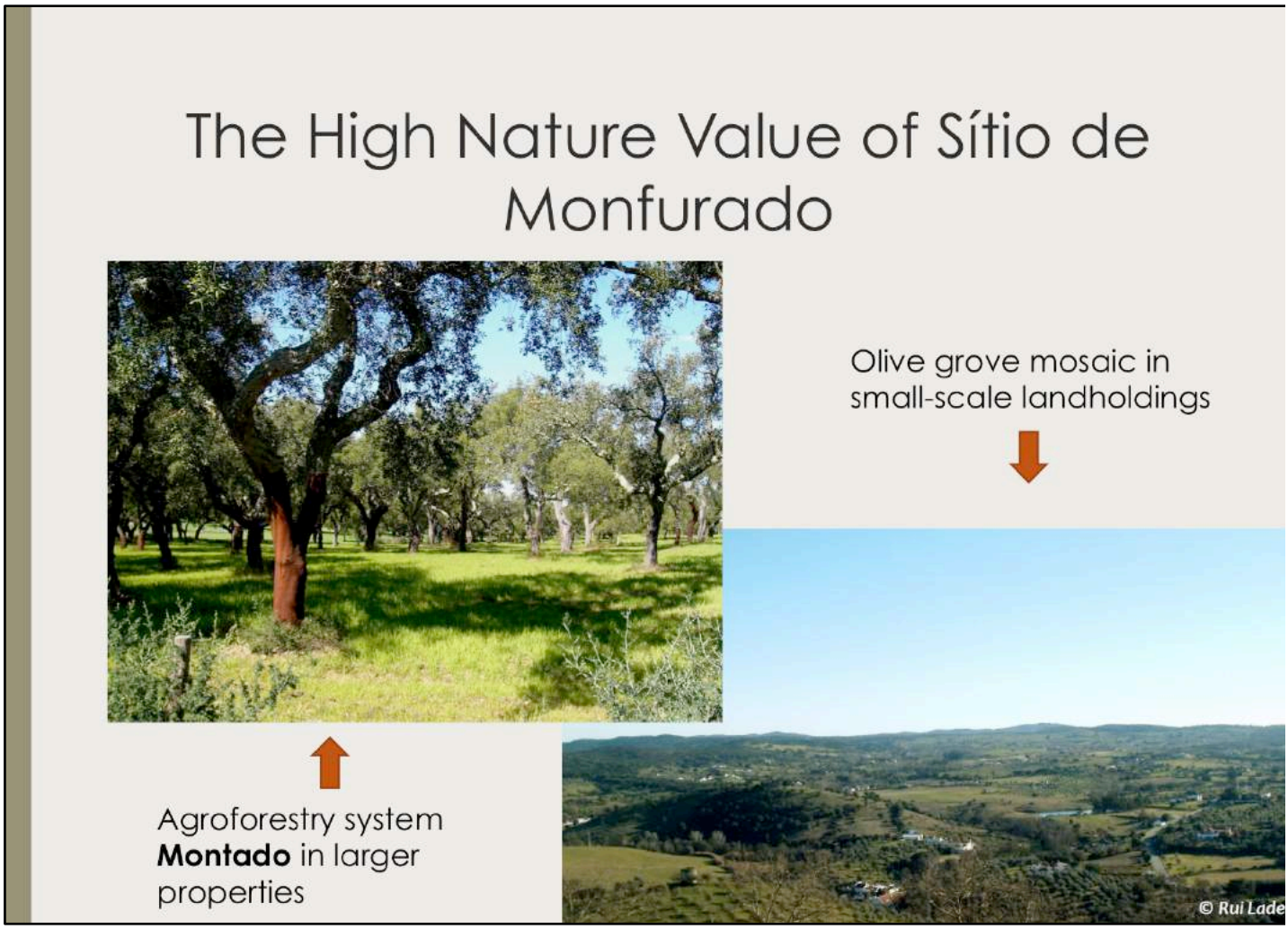


Landscape in the SM can be characterised by its main components, in terms of landscape units (largely dependent on the land cover).

The main differentiation factor is determined by the biophysical characteristics: the SM is characterised by a higher precipitation than the surrounding area, what in turn is caused by the more accidented relief and high hills (up to 400 m). This leads to a very dense and vigorous forest cover. The Montado, as already expressed in the slides before, is the dominant land cover. And it is a dense and diversified Montado, where the vigour of the tree cover creates an impression of a largely forested landscape. The Montado patches are intermixed with dense forest in the higher slopes and steep valleys. Furthermore, there are areas of open pastures and irrigated annual crops, in the plain.

The landscape is also characterised by dense and highly diverse riparian corridors, along the main streams crossing the SM. These may not be permanent streams, for the most, but still the presence of water for a large part of the year defines remarkable linear elements in the landscape. Besides the above mentioned land cover patches, there are also smaller areas of small scale mosaic and traditional olive groves, located in the surroundings of the villages. Even if these are less significant elements in the overall landscape patterns, these small scale parts of the landscape are present in the everyday life of the resident population, as they are located around the settlements.

The landscape is also characterised by the very low population density and lack of settlements - the population is concentrated is a few villages, and also in the towns of Montemor and Evora, which both are located just at the fringe of the SM. the settlements within the large estates used to be as small villages, with several families living in each of them - up to the middle of the 20th century. Today these estates settlements are reduced to one family, or are empty - therefore the concentration of the population in the villages is even more clear today. There are few roads or other infrastructures and no industry.



The landscape character in the Sítio de Monfurado LA is mainly dependent on two farming systems, both considered of High Nature Value (HNV): the agro-forestry system Montado, in larger properties, characterized by an open tree canopy of *Quercus rotundifolia* and *Quercus suber* and a diverse undercover of shrubs and grasslands, sometimes intermixed with agricultural crops, grazed by domestic and wild herbivore species and in a much smaller extent the olive grove mosaic in small-scale landholdings, mixed with vegetable gardens and orchards, surrounding the urban centres.

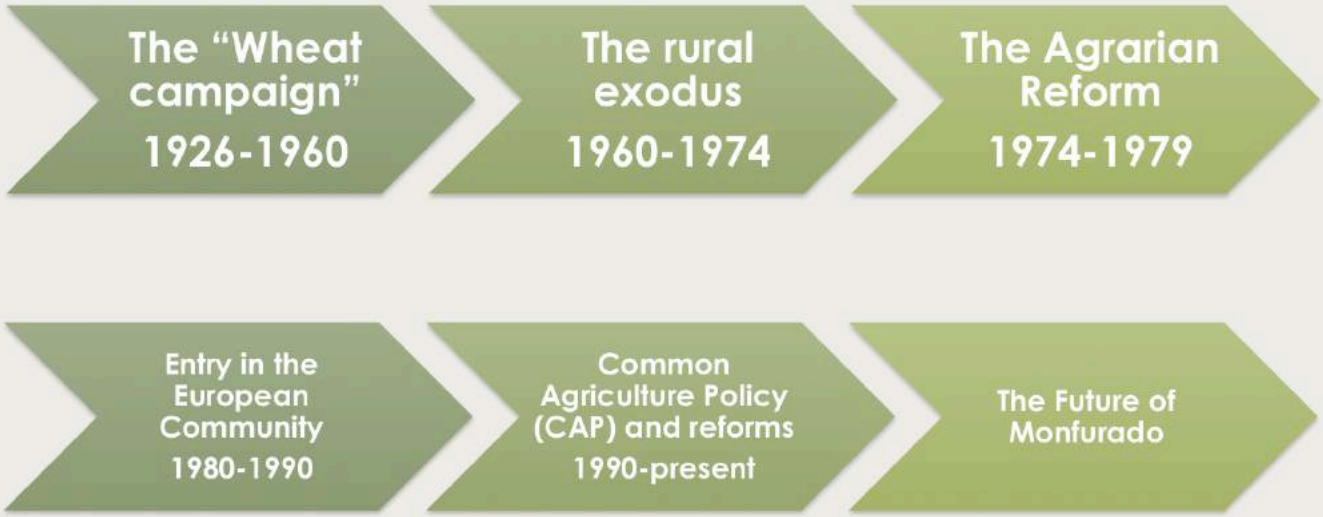
The object of this baseline assessment is the Montado in Sítio de Monfurado.

In the LA, Sítio de Monfurado, the diverse landscape of dense and mixed tree cover in the Montado patches, dense cork oak forests in the steep slopes and deep valleys, combined with open grazing areas in the plains, supports a rich and specific biodiversity, which justifies its classification as a Natura 2000 site. The Montado at the LA, provides multiple values and services and is recognized as an exemple of traditional silvo-pastoral system with a long history of resilience and sustainability (Pinto Correia et al., 2013).

References:

Pinto-Correia, T., Godinho, S., 2013. Changing agriculture-changing landscape: what is going on in the high valued Montado landscapes of Southern Portugal? In: Ortiz-Miranda, D., Moragues-Faus, A.M., Arnalte-Alegre, E. (Eds.), Agriculture in Mediterranean Europe: between old and new paradigms. Emerald Group Publishing, Bingley, pp. 75-90.

The Montado time line



Explaining the present with the past

The Montado Heritage from the past

From the Book of praiers of D Manuel (1517). Source: Dagoberto Markl (1983)

The far past of the Sítio de Monfurado is mingled with the past of Montado within Alentejo region. The Montado is the result of human intervention in the primitive dense shrub formations dominated by *Quercus coccifera.*

Hystorical analysis refer a diversified land use system, which is considered as the origin of Montado as early as in the XIIth century (Pinto-Correia and Fonseca, 2009). The Montado evolution at those past times is describd as follows:

"*The natural forest and maquis formation was dominant in the Middle Ages, but patches with a more open and diversified agricultural use were already present during that period. Acccording to changes in factors such as the political situation, property rights, population, demands, technology, and sensitivity and strategies from the central decision makers, the progressive transformation and use of the previous natural vegetation has been changing in intensity and form along the centuries. ..... The most remarkable in this historical overview is the maintenance of the same complementarities in the overall land use along several centuries, and the possibilities of all types of resources to be used by humans, in various ways. Furthermore, the capacity of resilience from this agro-silvo pastoral system is remarkable. A system with the same components was maintained, since centuries ago until today, being still today the dominating land use despite the radical changes in context in modern times.*" (Pinto-Correia and Fonseca, 2009).

References:

Pinto-Correia, T., & Fonseca, A. M. (2009). Historical perspective of montados: The example of Évora. In J. Aronson, J. Santos Pereira, & J. G. Pausas (Eds.), Cork Oak Woodlands on the Edge: Ecology, Adaptive Management, and Restoration (pp. 49–56). Washington: Island Press. Retrieved from http://issuu.com/pausas/docs/corkoak

Relevant happenings – Drivers

- Establishment of dictatorial regime (1928)
- "Wheat Campaign" (1929)
- Agricultural mechanisation started – state support to fertilisers and machinery (1950-63)
- Rural depopulation (to big sities, 1950)
- Swine fever –decay of free range black pigs and holm oak marginalisation (1957)

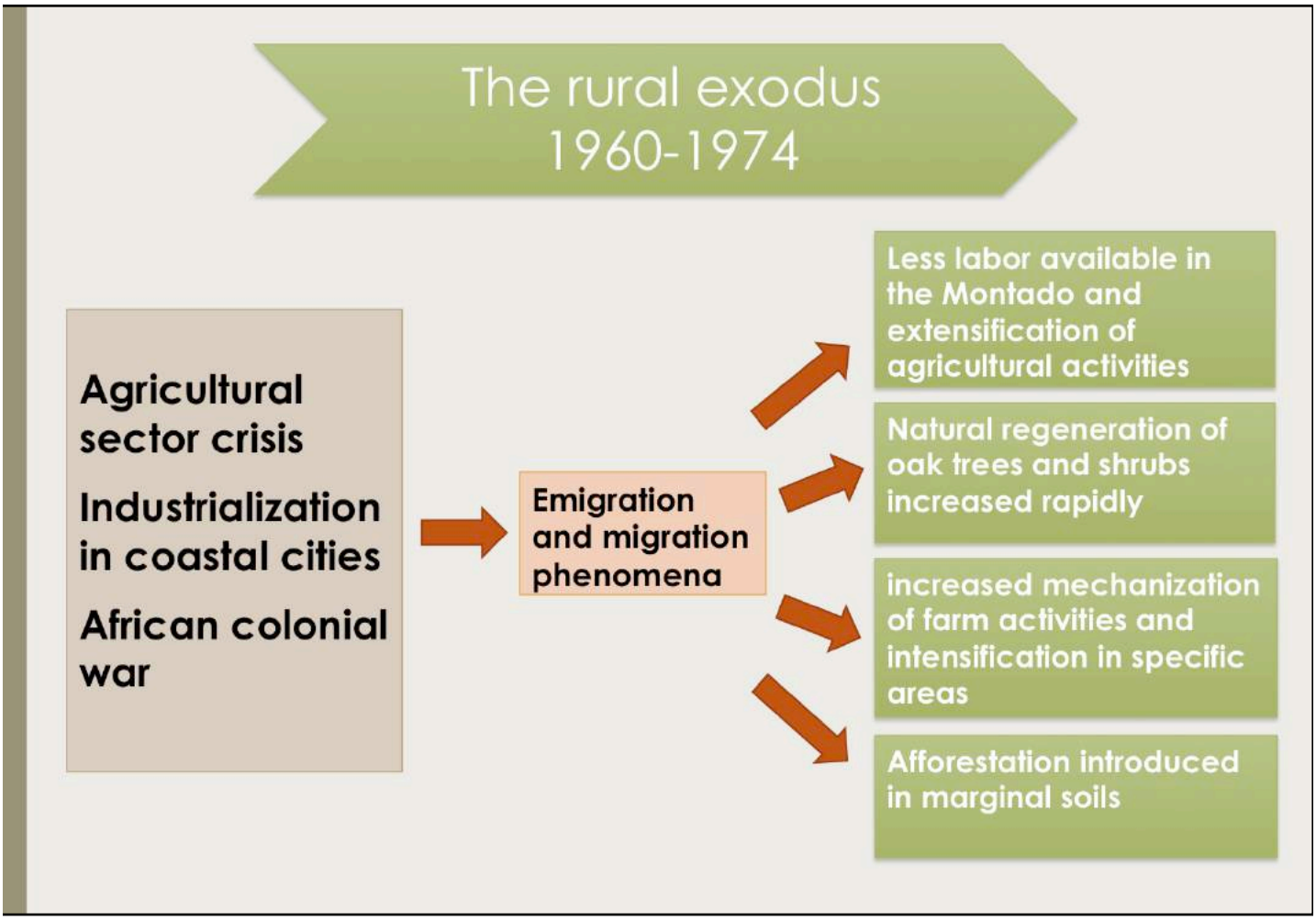
Consequences for the Montados

- Land clearance in order to extend cultivated areas and obtain more wheat: thousands of hectares in southern Portugal, even poorest soils, were cleaned and intensively cultivated with wheat.
- The adoption of fertilisers and machinery allowed the intensification of crop rotations
- Intensive cereal cultivation led to soil depletion, destruction of cork and holm oak natural regeneration, and partial or total elimination of trees.
- 1930–1950 was the period with the highest disappearance Montado during the twentiethy century.

References:

Pinto-Correia, T., & Mascarenhas, J. (1999). Contribution to the extensification/intensification debate: new trends in the Portuguese montado. Landscape and Urban Planning, 46(1), 125-131.

Ferreira, D. (2001). Evolution of the Montado landscape in the inner Alentejo during the 20th century: Dynamics and environmental consequences. Finiterra, XXXVI, 72, 179-193



Relevant happenings – Drivers

- Agricultural sector crisis (1950-1974) - decline of the traditional agricultural land use systems with simplification and rationalisation in the use of resources, particularly human resources. Decline of the number of people living in rural areas, and thus severe ageing and decline of the smallest and most peripheric communities
- Industrialisation in coastal cities (e.g. Lisbon–Setúbal axis since the 50s)
- African colonial war

Consequences for the Montados

- Emigration and migration phenomena, caused both by the reduction of labour absorbed by agriculture and the attraction of new jobs in the industry and urban areas, accelerated the depopulation of rural areas, mainly in 1960–70.
- Less labour was available for the Montado, however abandonment was not a reality in the Montado in Alentejo as it was in other parts of the country with smaller size property.
- At the start of the 1960s, the land clearing subsidy is suspended and wheat cultivation on marginal soils abandoned.
- Natural regeneration, mainly shrubs and cork trees, increased rapidly due to their adapted physiology.
- Afforestation in marginal soils, mainly by pine trees and eucalyptus, was introduced.

References:

Pinto-Correia, T., & Mascarenhas, J. (1999). Contribution to the extensification/intensification debate: new trends in the Portuguese montado. Landscape and Urban Planning, 46(1), 125-131.

Ferreira, D. (2001). Evolution of the Montado landscape in the inner Alentejo during the 20th century:

Relevant happenings – Drivers

- The dictatorial regime fall (1974)
- Agrarian Reform (1975)
- Expropriation of large farms (latifundio)

Consequences for the Montados

- Intensive cereal production returned and intensive use of the Montado also, including harvesting of cork with less care for the resilience requirements of the trees.
- This new intensification phase is short but very aggressive due to the heavy machinery used for faster clearance of agricultural land, where many trees were uprooted, and livestock overgrazed on Montado.

References:

Pinto-Correia, T., & Mascarenhas, J. (1999). Contribution to the extensification/intensification debate: new trends in the Portuguese montado. Landscape and Urban Planning, 46(1), 125-131.

Ferreira, D. (2001). Evolution of the Montado landscape in the inner Alentejo during the 20th century: Dynamics and environmental consequences. Finiterra, XXXVI, 72, 179-193

Relevant happenings – Drivers

- Preparation support programs for the entry of Portugal in the European Community (1980, 1985)
- Entry of Portugal into the European Community (EC) (1986)

Consequences for the Montados

- Access to various EC financial support programs to develop the agro-forestry sector and prepare the country for international markets.
- Beginning of the fall of customs protections, although the effects of this will be softened by a 10 year period of transition.
- Some of the abandoned agricultural land and soils with low agricultural capacity have been converted into wooded areas using faster growing trees, mainly Eucalyptus and Pinus pinaster. These emerged as a viable alternative to the economy of some agroforestry holdings.
- Opening of the international markets and the reduction of crop prices (23% between 1985 and 1989), market-orientated cultivation of cereals became unprofitable in the Montado and dwindled.
- Livestock production and grazing areas in the Montado significantly increased due to direct financial support systems.

References:

Pinto-Correia, T., & Mascarenhas, J. (1999). Contribution to the extensification/intensification debate: new trends in the Portuguese montado. Landscape and Urban Planning, 46(1), 125-131.

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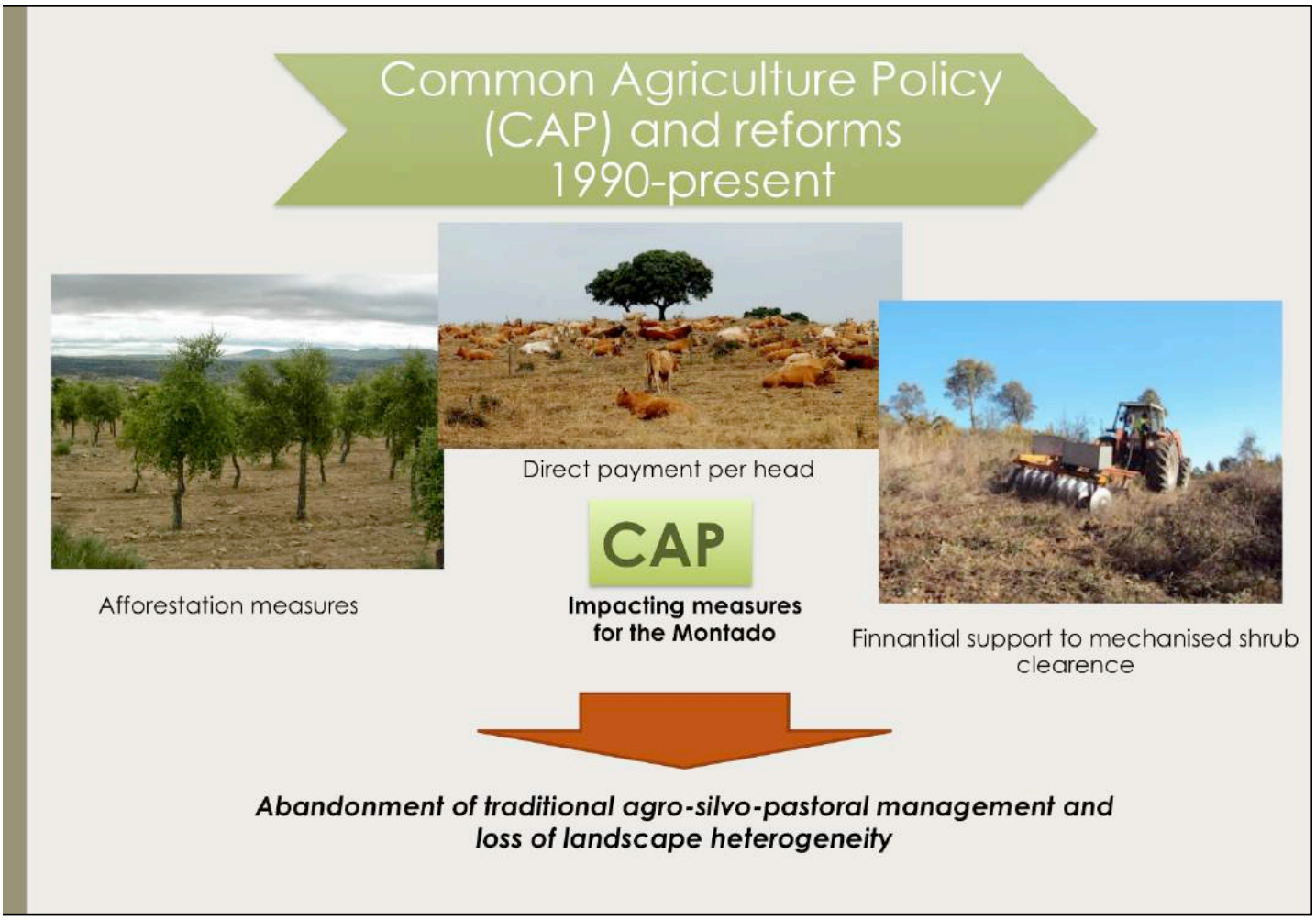


Relevant happenings – Drivers

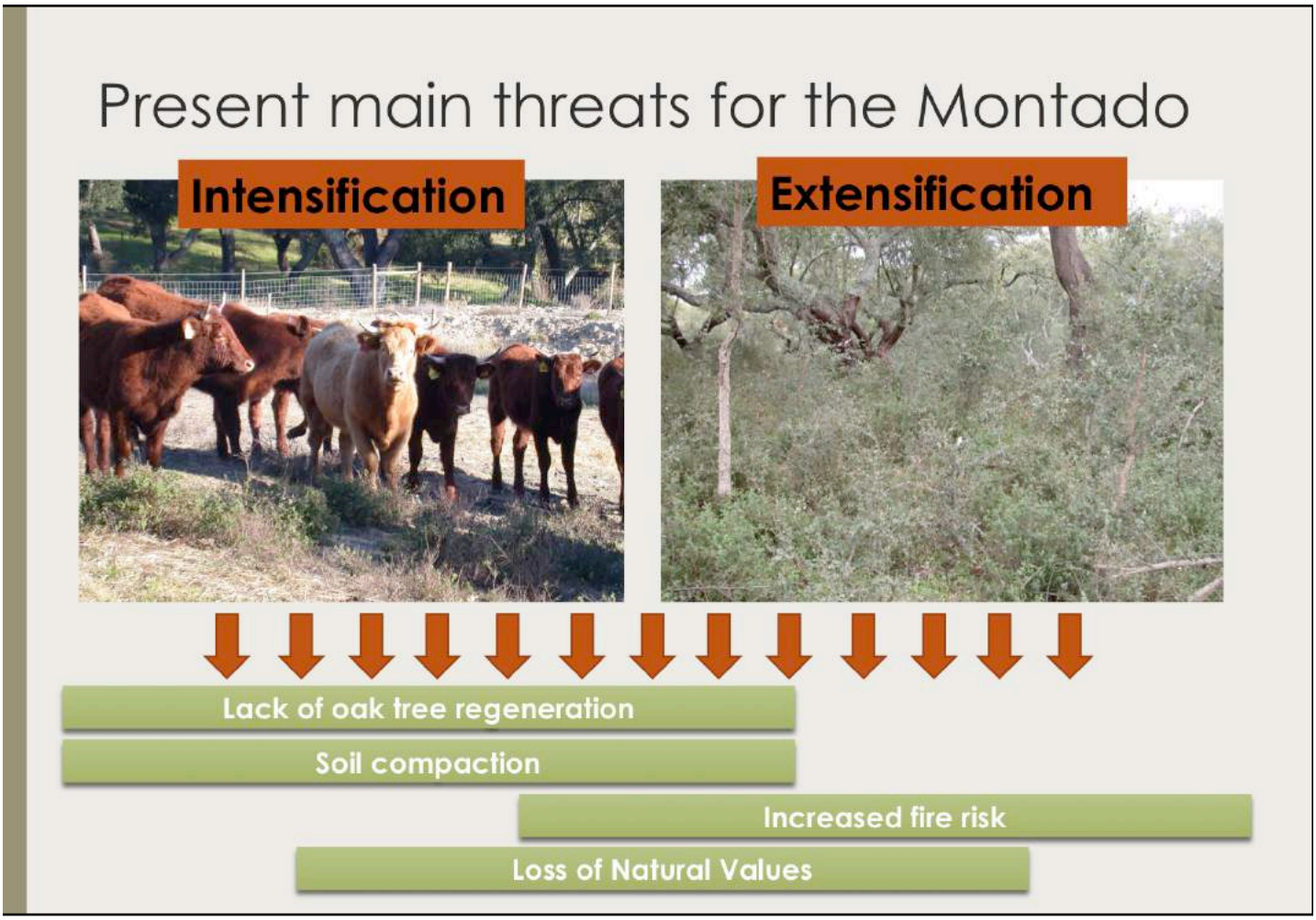
- Common Agriculture Policy (CAP) and reforms
- Launch of European Single Market (1993)

Consequences for the Montados

- Large and complex network of agro-forestry incentives for rural development.
- The reforms involved immediate price realignments for the main agricultural commodities to be phased in c the period 1992 to 1995.
- The 1992 CAP reform introduced direct payments per animal, reducing intervention prices. These head payments, partially independent of production, contributed to stabilising income in agro-silvo-pastoral far especially in climatically unfavourable years.
- The economic attractiveness of the CAP incentives for livestock led many landowners to explore this finan support, and as a consequence many Montados were intensively grazed.
- European Union (EU) subsidies tended to support mechanised shrub clearance and infrastructure build often leading to degradation of Montados.
- Agri-environmental and afforestation measures were implemented under CAP investment as a follow measures to compensate the farmers for the reduction of direct support.
- Cork oak area afforestation increased in set-aside agricultural lands due to several EU policies.
- Severe wildfires occurred due to the abandonment of traditional agro-silvo-pastoral management and the of landscape heterogeneity.

References:

Coelho MB, Paulo JA, Palma JHN, Tomé M (2012) Contribution of cork oak plantations installed after 199(Portugal to the Kyoto commitments and to the landowners economy. Forest Policy Econ 17:59–68.
Pinto-Correia, T., & Mascarenhas, J. (1999). Contribution to the extensification/intensification debate: new trend the Portuguese montado. Landscape and Urban Planning, 46(1), 125-131.



Despite the widely recognized value and resilience of the Montado its balance is threatened by a number of factors resulting in extensification and abandonment in more peripheral and marginal areas and intensification in more favourable areas.

In our LA the Montado is particularly prone to **intensification**:

- Over-exploitation of the tree cover
  - unbalanced cork harvest
  - pruning for charcoal production
- Intensification of activities in the undercover
  - Mechanized ploughing with deep ploughs and consequent irreversible damage of the tree root system
  - Overgrazing without a correspondent investment on the improvement of pastures

These may hinder natural regeneration of the trees and create homogeneous stands that which ultimately will induce decline of the Montado.

The threat of abandonment and **extensification**, though residual in the LA , it may occur leading to:

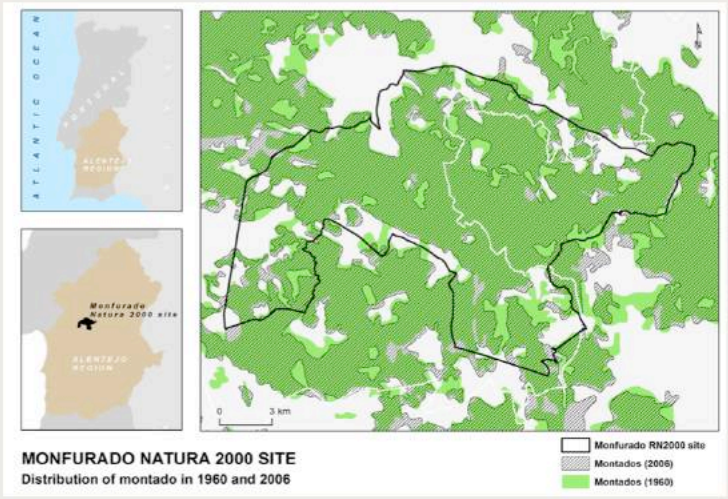
- Shrub encroachment
- Increased competition among vegetation species
- Increased risk of forest fires

Trends in the Montado

Spatial decline and landscape fragmentation

Year	1910	1960	1990	2006
Total area (km²)	3,152.95	4,030.35	3,544.15	3,466.77
Relative area (% Central Alentejo)	43.60	55.81	49.16	47.68
Number of patches	116	208	248	306
Mean patch size (km²)	27.18	19.38	14.29	11.33
Variance (%)	5,54	4,41	3,71	3,35

(Godinho *et al.*, 2016)



MONFURADO NATURA 2000 SITE
Distribution of montado in 1960 and 2006

Spatial decline and fragmentation of Montado in the LA Sítio de Monfurado.

1960 to 2006

Changes in the Montado patern in Central Alentejo:

- Continuous decline of the total area covered by Montado, after 1960.
- Progressive fragmentation of the Montado, evidenced by the increase in the number and decrease in the s of Montado patches. This results in a less dense Montado with more discontinuity.

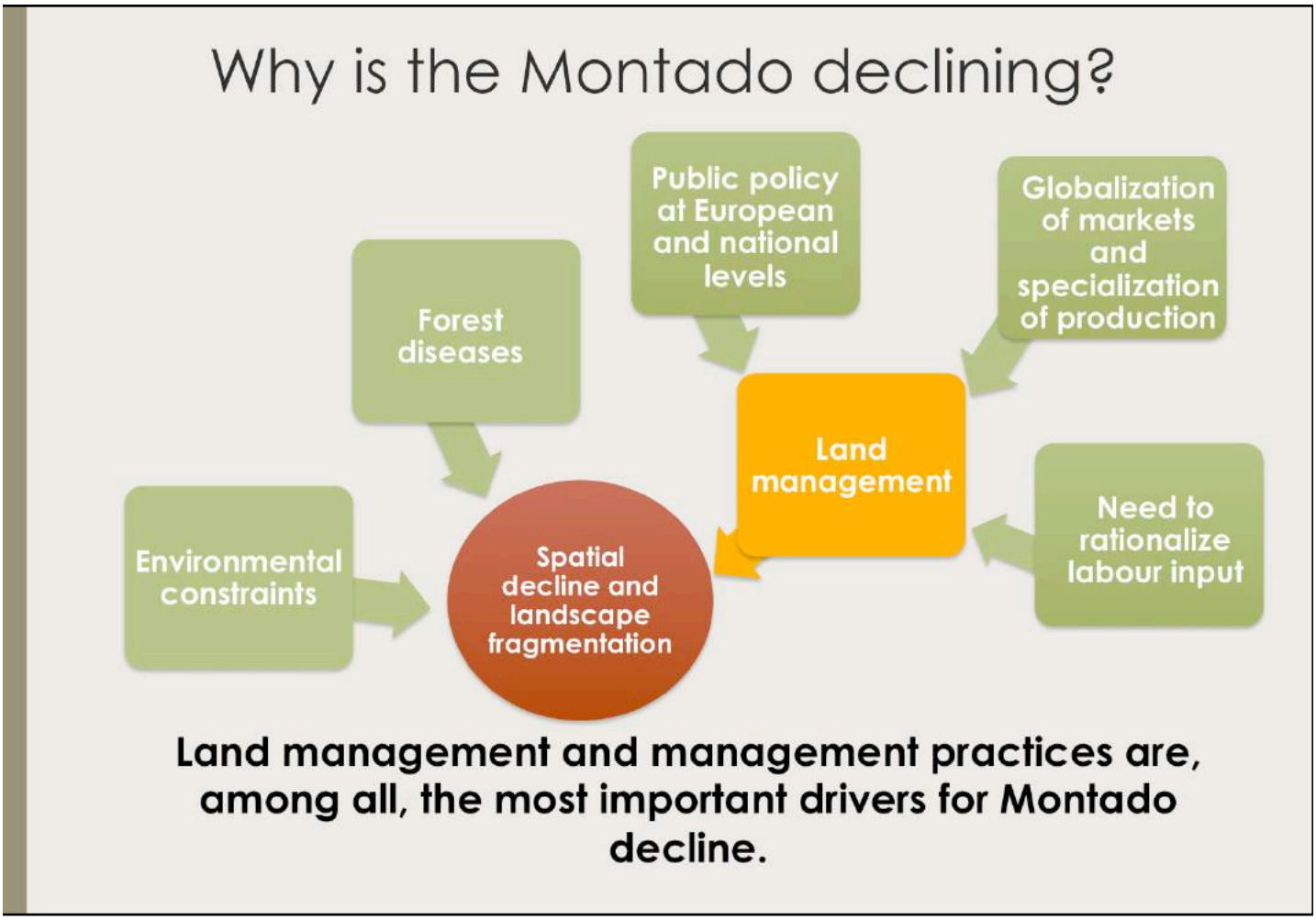
It is highlighted that the decline in Montado area is stronger than what is shown in the data (Godinho et al., 20 Afforestation of previous open plots has been carried out in the last two decades, with support of the CAP. Thus, figures show the total decline minus the recently planted plots. If only the decline was shown, the figures woulc higher. Furthermore, decreases in tree density due to dead trees, at farm scale are presently reported by increasing number of farmers.

"*The process of decline is slow, due to the high ecological resistance and resilience of the oak trees, but in sc areas may be reaching to a point of no return, requiring short, medium and long term actions to reverse trend.*" (Guiomar and Pinto-Correia, 2016)

References:

Godinho, S., Guiomar, N., Machado, R., Santos, P., Sá-Sousa, P., Fernandes, J.P., Neves, N., Pinto-Correia, T., 2C Assessment of environment, land management, and spatial variables on recent changes in montado land cove southern Portugal.Agroforestry Systems 90: 177-192.

Guiomar N., Pinto-Correia T. (2016), Socio-political, economic and institutional drivers. National Report – PORTUG Deliverable WP3.1. Pegasus, H2020 project, Grant agreement No 633814.



Main causes for the Montado decline (Godinho et al., 2016):

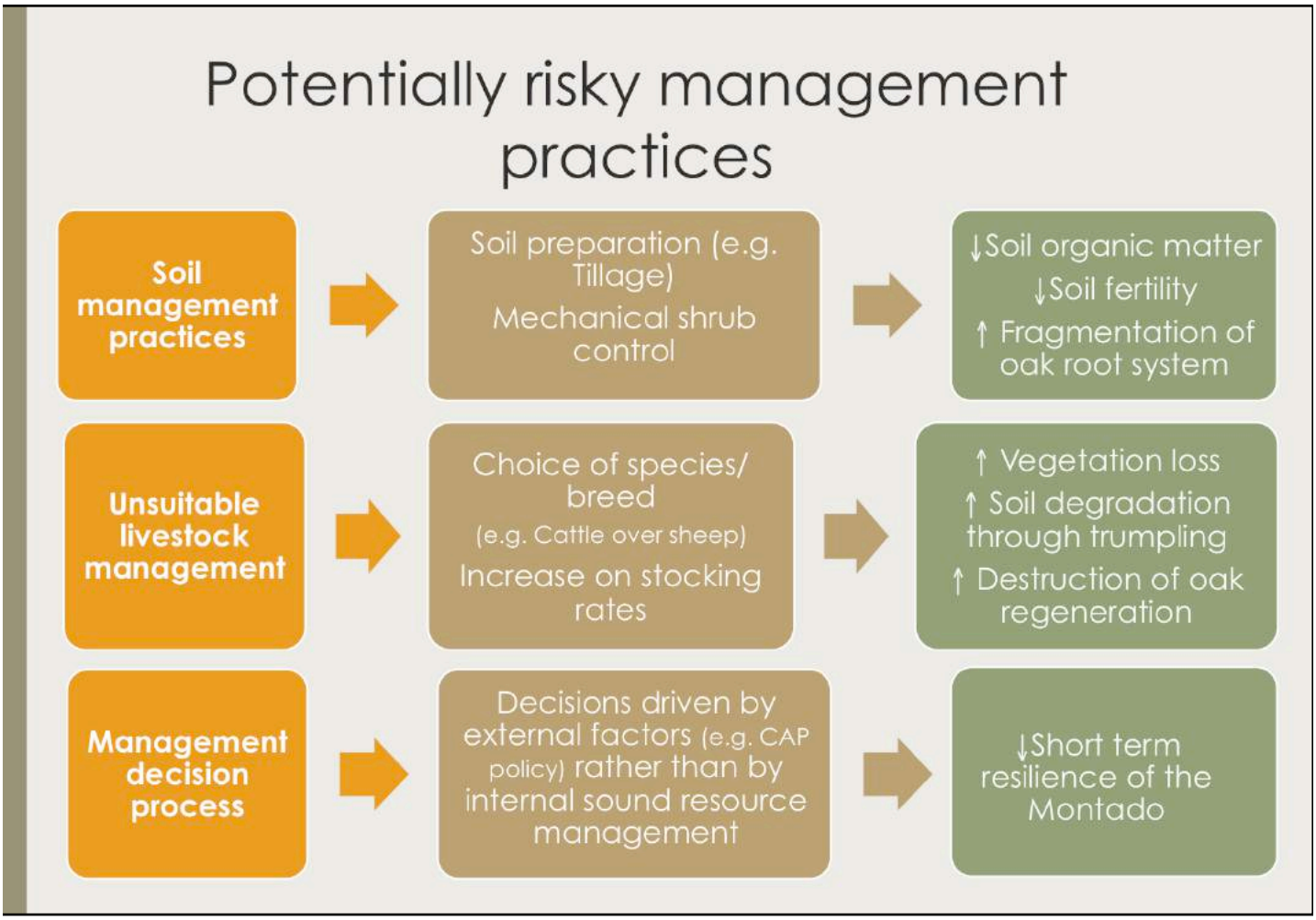
- Environmental constraints (such as soil type, hydrological conditions and wild fires);

- Oak diseases (e.g. Phytophthora cinnamomi fungus and insect attacks);

- Factors associate with changes in National and European policies and other sócio-economic factors:
    - Land management (increase in mechanisation and unsuitable animal stocking rates)
    - Vulnerability of the agricultural economy
    - Rural depopulation;
    - Abandonment of traditional agricultural activities

References:

Godinho, S., Guiomar, N., Machado, R., Santos, P., Sá-Sousa, P., Fernandes, J.P., Neves, N., Pinto-Correia, T., 2016. Assessment of environment, land management, and spatial variables on recent changes in montado land cover in southern Portugal. Agroforestry Systems 90: 177-192.

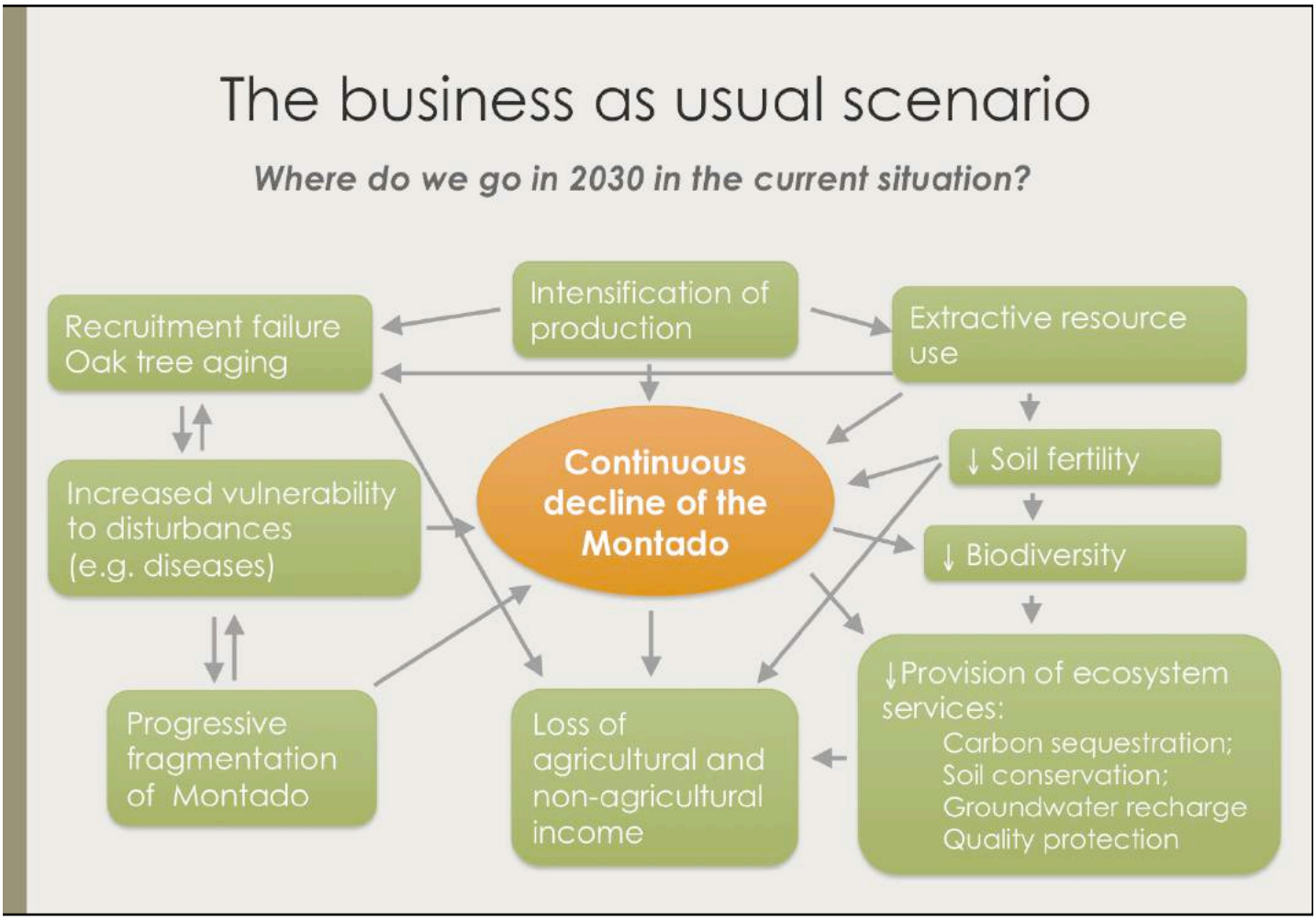


There are various different and often simultaneous management issues, mostly driven by a need to increase economic sustainability, that contribute to increased intensification pressures on the Montado, particularly on the tree cover, grazing resources and on the soil which is the support basis of the system: replacement of sheep by cattle, replacement of light indigenous breeds of cattle by heavier cross breeds, increases in the stocking rates, soil management and shrub control practices using heavy machinery.

Furthermore, the whole decision making process is focused on external, mostly European and National policy factors. Farmers are abandoning a resilient thinking of their farm system considering the factors internal to the system, to adapt an external, driver oriented representation of their farm system. CAP coupled payments are seen as the main cause of this change (Pinto-Correia and Azeda, 2017).

References:

Pinto-Correia, T. and Azeda, C. (2017). Public policies creating tensions in Montado management models:Insights from farmers' representations. Land Use Policy 64: 76–82.



The long term and continuous pressure on the Montado relates mainly to recruitment failure, tree aging and an extractive resource use that in turn results in an increased vulnerability to various disturbances, a decrease of natural value and ultimately in a loss of agricultural and non-agricultural income.

The consequences of the present declining scenario of the Montado, in Sítio de Monfurado mainly associated with the intensification threat, will be acknowledged at a variety of levels: ecological, territorial, socio-cultural, economic and even aesthetic level .

The economic driving forces
Food chains and market

- Main forces explaining agricultural economy and markets:
  - Globalization of markets and food chains and pressure for specialization in production: Montado has producers of high quality veal for international beef market
  - Increase in labour costs and constraints in labour diversification on the farm: pressure for simplification of a highly diversified production system
  - Alternative and quality based food chains: localized and limited impact

- Who are the actors?
  - Land managers,
  - Livestock associations (APORMOR)-comercialization of livestock
  - Corck traders (including extractors)
  - Consumers
  - Policy makers, mainly at national level

A considerable number of protected designation of origin (PDO) and protected geographical indication (PGI) products for which the LA is an eligible region, though not exclusively have bee certified.

This include veal - “Carne de Bovino Mertolenga” (DOP), “Alentejana” (DOP); pork “Porco Alentejano” (DOP); lamb “Borrego de Montemor-o-Novo” (IGP), honey “Mel do Alentejo” (DOP) and cheese “Queijo de Évora” (DOP). These products, although certified an entitled to use the EU quality logos do not seem to be driving any particular development in the LA.

The Montado at the SM is an increasing highly valued landscape.

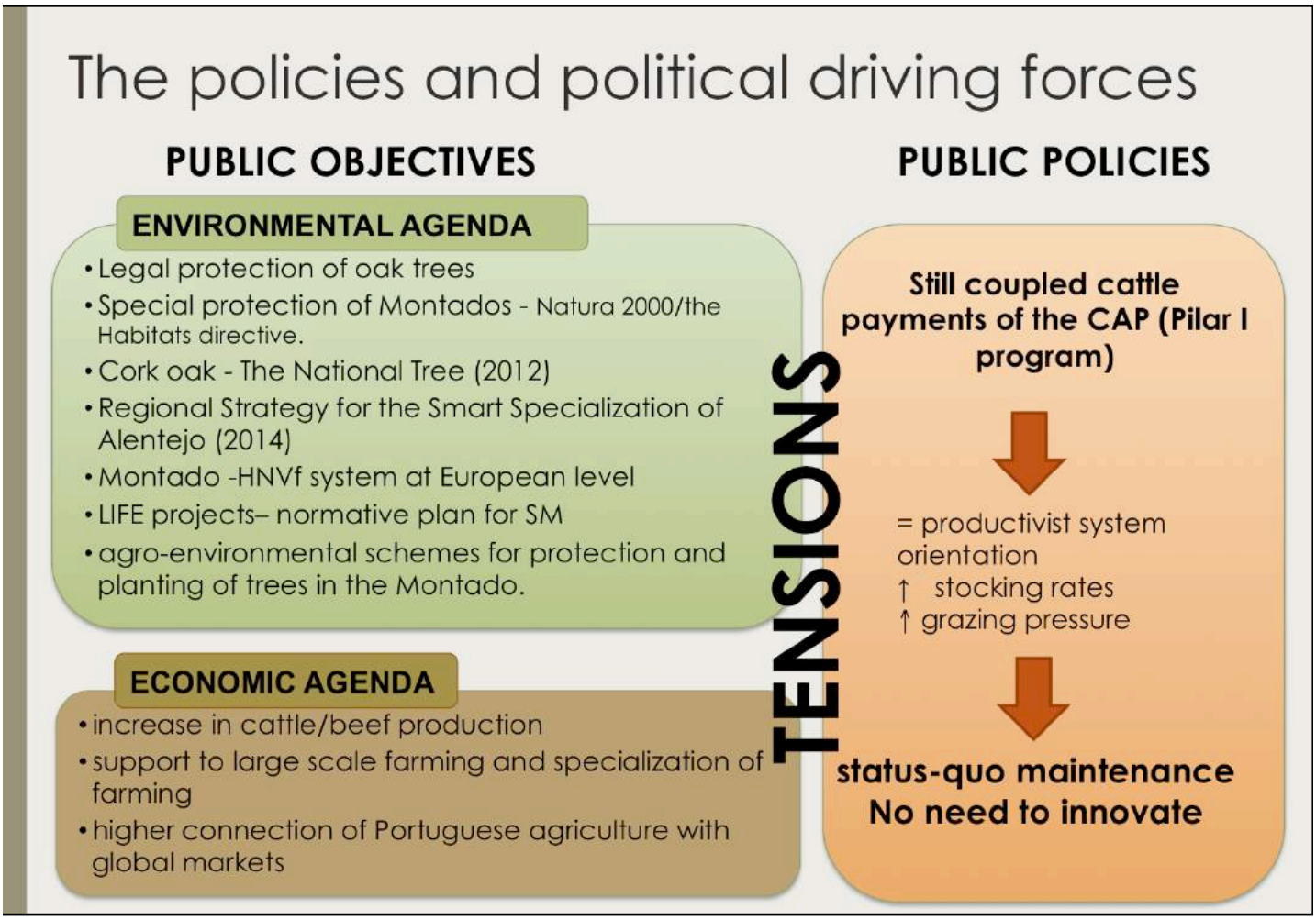
The LA is considered a hotspot of biodiversity with a high potential for development of recreational activities, bird watching, nature observation walks, cultural activities and hunting. Other than agriculture, touristic and cultural activities are the most important drivers for rural development within the LA.

Major players are NGOs such as MARCA in Montemor-o-Novo, Monte-Ace (LAG) in Arraiolos and Terras-Dentro (LAG) in Alcaçovas that work on the development of local strategies, supporting stakeholder networking and promote projects in the social, cultural, environmental preservation and valorization of the natural and built heritage.

The two LAGs also have responsibilities in defining and launching of Leader calls.

Some private companies and a small number of land managers are also involved in touristic activities, both providing accommodation in the form of rural tourism and eco-tourism and promoting cultural activities related to nature, heritage and gastronomy.

The municipality of Montemor-o-Novo is also an important actor with responsibility in the maintenance of nature trails and the interpretation centers of the Escoural caves and the of the Sítio de Monfurado.



The Common Agriculture Policy (CAP) has been the major instrument for state intervention in agricultural systems. There is presently a tension between stated public objectives regarding the Montados and public policies that affect the Montados.

Indeed, two agendas are identifies within the public objectives, an environmental agenda where strategies related to nature conservation, cultural heritage, and tourism promote the Montado as an important system to be preserved and enhanced due to its cultural and natural values and an economic agenda that supports large scale productivist and specialized farming.

On the side of the the public policies the most visible impacting management decisions in the Montado is the still coupled livestock payments which are maintained in Portugal as part of the Pilar I program.

Examples of public policies and objectives at national, regional and even local level in the LA that promote the protection of Montados are:

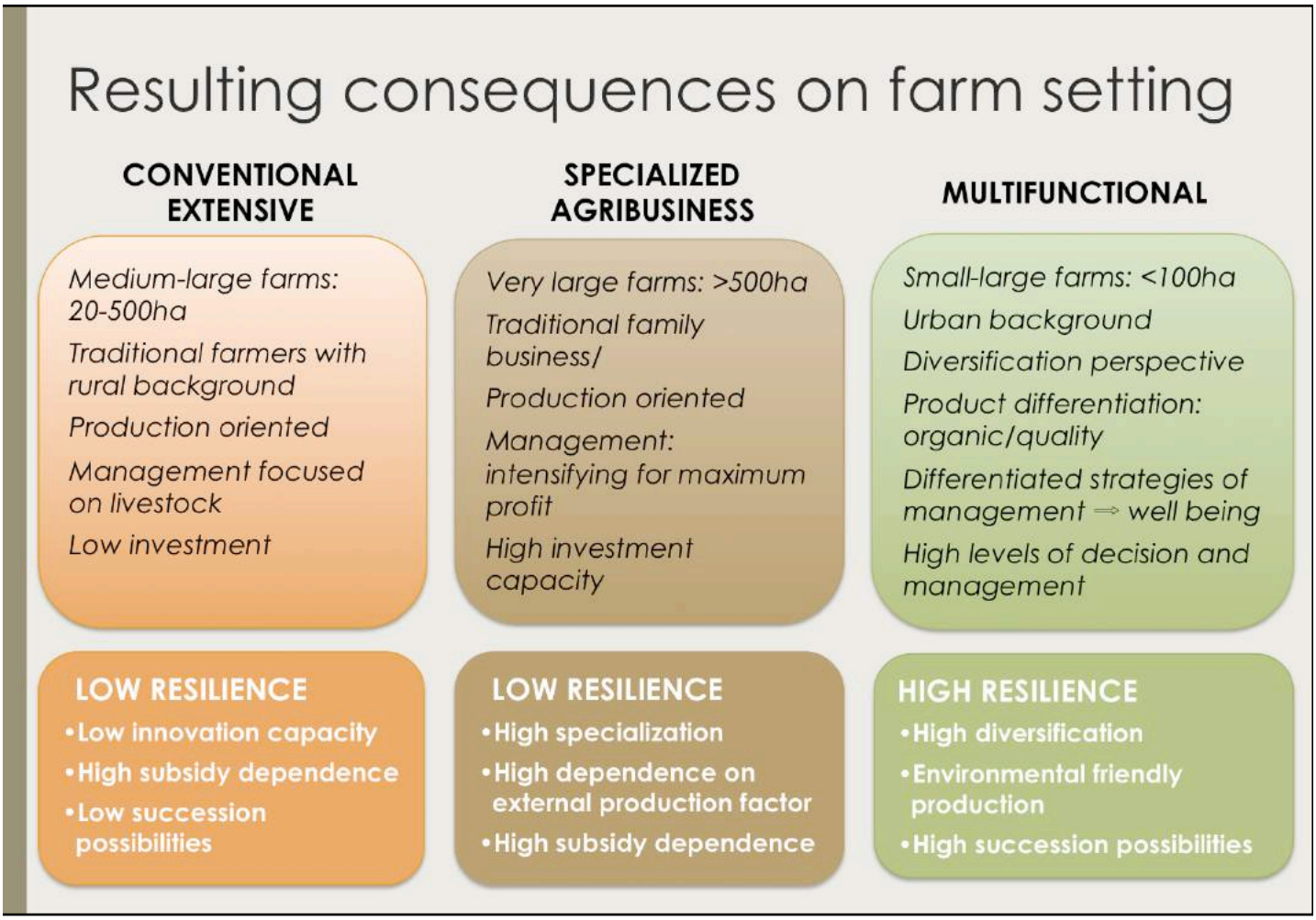
- Legal protection of oak trees (Decree 155/2004 of 30th June)
- Special protection of Montados through Natura 2000 and the Habitats directive.
- Cork oak declared the national tree (National parliament resolution n.º 15/2012, 10th February)
- agro-environmental schemes for protection and planting of trees in the Montado.
- Regional Strategy for the Smart Specialization of Alentejo (2014)
- LIFE projects and other projects supporting extensive management in Montado (LIFE GAPS)
- The plan of intervention in the rural área of "Sítio de Monfurado", officially published by the Municipalities of Montemor-o-Novo and Évora (Aviso nº3453/2011, Diário da República nº22, II Série de 1st February and Aviso nº3305/2011, Diário da República nº21, II Série de 31st January)

A number of relevant initiatives supporting the Montado and contributing to dissemination of its values are in place, at various levels. These initiatives contribute to the engagement of local actors and reinforce the regional and even national identity character of the Montado.

The most relevant initiatives at the local level have been the LIFE program GAPS coordinated by the Montemor municipality and various other research projects mostly coordinated by the University of Évora that used the Sítio de Monfurado as a case study.

At the regional level, the yearly fair of Montado and the acorn week initiative that involves local companies, in particular restaurants that during a week use products of the Montado in their menus are examples of awareness raising initiatives where the general public has the opportunity to gain knowledge on the Montado ecosystem and its products.

At the National level the green book of Montados published in 2013 is a concise report on the present state of the ecosystem Montado supported by the research and academic community, most associations of land-managers and producers that promotes a shared understanding of the system. Another very relevant initiative was the establishment of the "*Centro de Competências do sobreiro e da cortiça*" that includes National level research institutions, public administration, land-managers and producers, as well as the producers associations that altogether have developed a national research and innovation agenda on cork oaks and cork. This agenda represents a National research and innovation strategy for the cork oak Montados.



The farm management models in the LA were described by Pinto-Correia (2013) in three different groups: Conventional extensive, specialized agribusiness and multifunctional innovative.

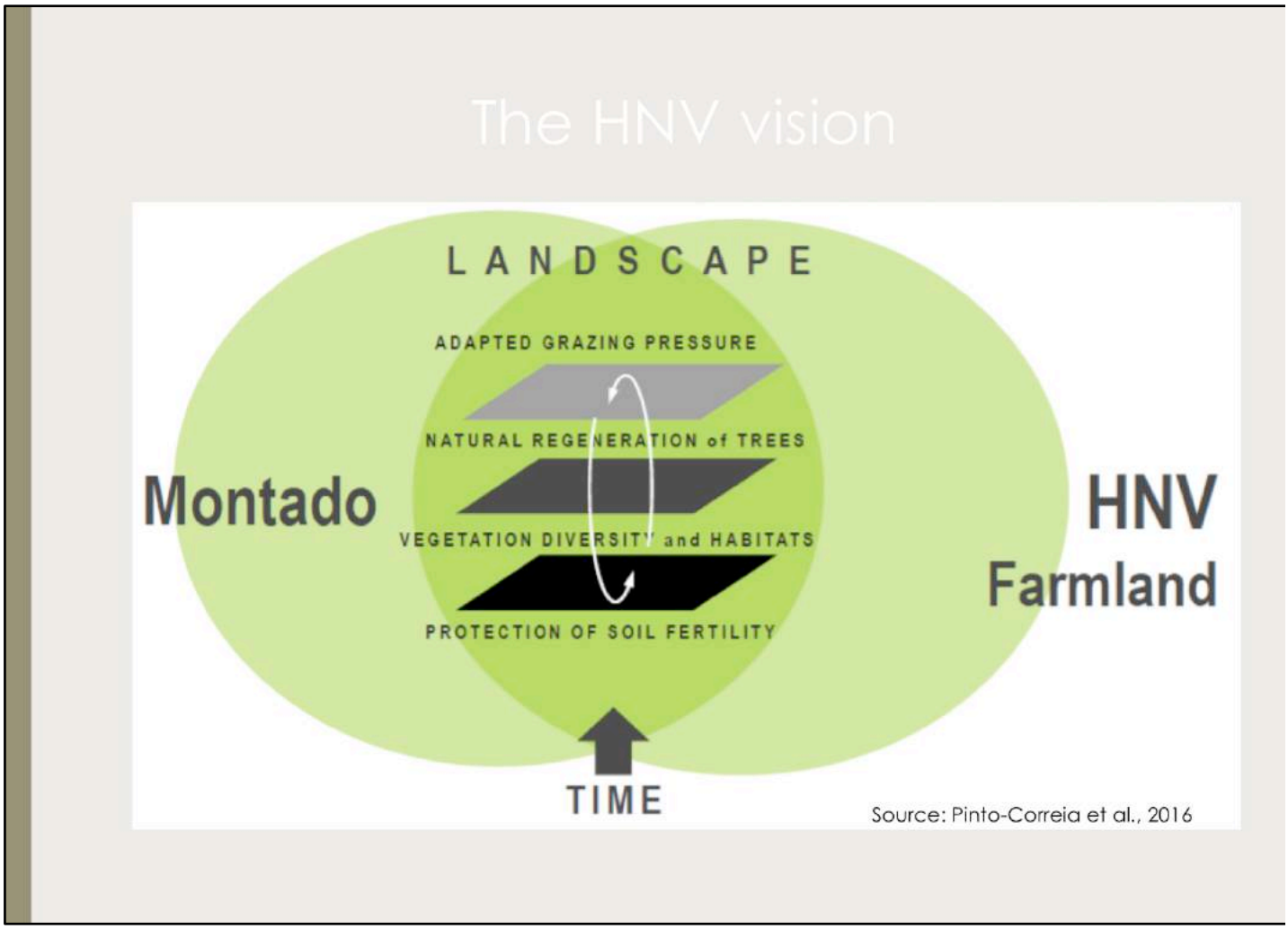
- The first group is frequently associate with medium to large sized farms in the LA context. In most cases the farms are managed by their owners, living in the farms (no secondary land managers) and often having a rural background. Management in this type o farms is production oriented and mostly monofunctional, focused on livestock rearing. Investment and innovation capacity is usually low.

- The specialized agribusiness farm type is also production oriented however with a level of intensification introduced to maximize profits. It is usually associated with much larger farms (greater then 500ha) and working as a family business where day to day management is carried out by contracted "sub land managers" while main decisions are taken by the owners. Often the owners do not live permanently in the farm, and have a high investment capacity. The management of this farms is usually highly specialized and also dependent on resources coming from outside of the farm such as feed supplements for cattle.

- The third group of farms, usually much smaller (<100ha) is the multifunctional type. These farms are managed with a diversification and multifunctional perspective and have deep concerns regarding environmentally friendly production methods (e.g. integrated and organic agriculture).

References:

Pinto-Correia T. 2013. Understanding changes in rural landscape management: contributions from transition theory. Oral communication: CBA Seminars in Ecology and Evolution, Faculdade de Ciências da Universidade de Lisboa, 14 October. Lisbon, Portugal.



A common vision for the future of Montado in the LA Sítio de Monfurado acknowledges, promotes and valorises the inherent features of this complex agro-silvo-pastoral system while also maintaining its intrinsic rurality. This vision was built with the participation of a number of stakeholders using focus groups within a previous European FP7 project (FarmPath) and interviews carried out under the HNV-Link project.

The Montado in this vision is considered as an identity element of the land use and is valorised as an agro-silvo-pastoral system and recognised as a biodiversity hot spot with multiple public services. The differentl "layers" of the ecosystem (soil, herbage and shrubs, trees and animals) are interdependent and directly affected by management activities. The various products of this unique ecosystem are also intimately connected to the identity of the Montado in this vision.

The present decline of the Montado which may lead to more discontinuities and less dense covers and even disappearance in certain areas will impact the valued landscape and rural identity.

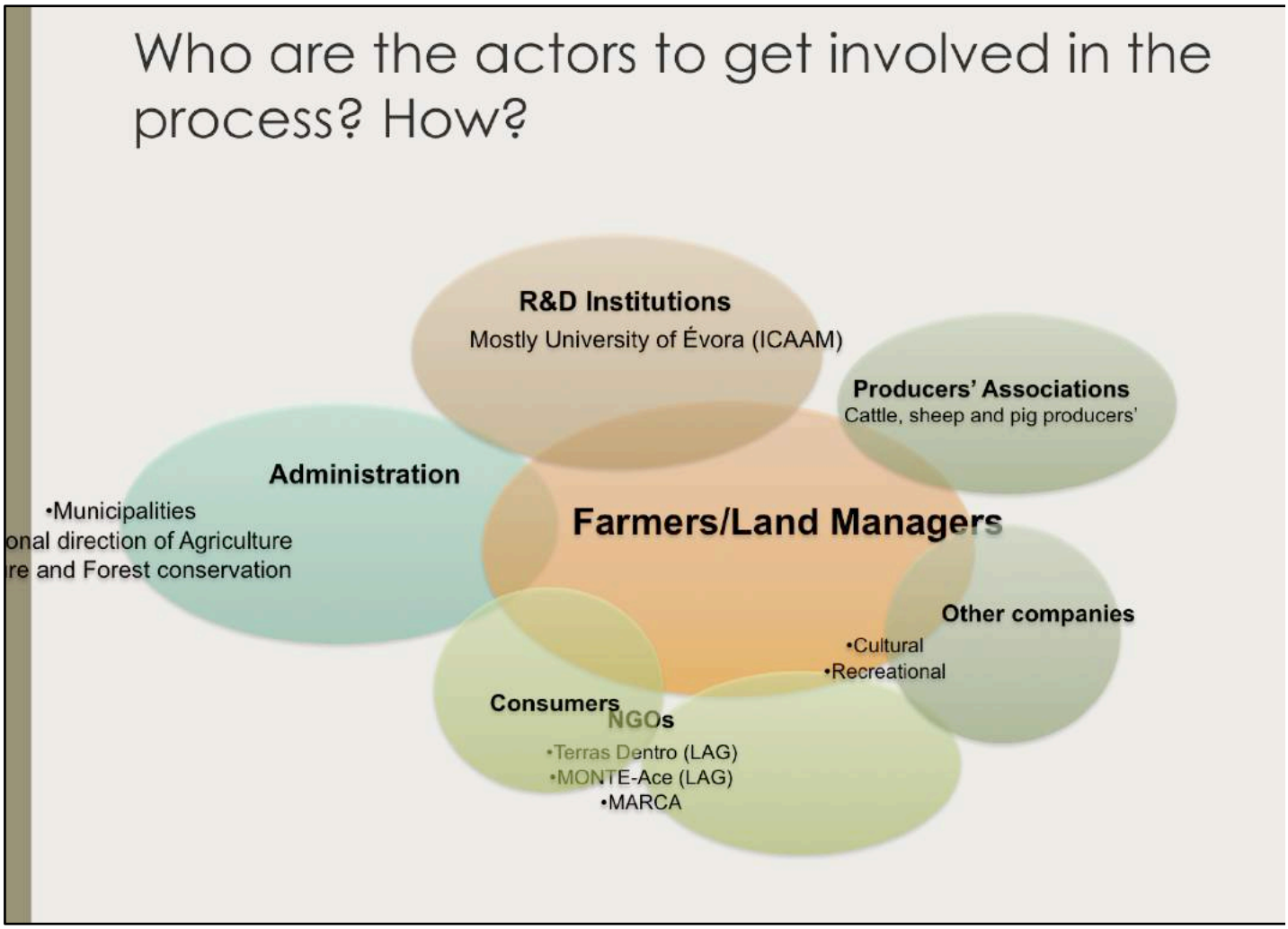
In order to preclude this declining trends with implications on the differentiating character of the landscape, this vision put forward the creation of a prestige brand of Montado. The creation of a Montado brand requires cooperation between actors, strategic plan, training and leadership. The Montado brand will act as a recognized identification umbrella for all products and services coming from the Montado, enabling a more coherent commercialization and supporting the creation of added value which in turn support sustainable management.

What does need to be addressed for the HNV vision

Main problems to overcome

- *Low soil fertility*
- *Lack of new oak trees*
- *Undifferentiated products*
- *Resistance to multifunctionality*
- *Economic agenda supporting productivis and specialization farming*
- *Lack of investment of farmers in improving management practices*

- *Soil management to restore and gain fertility*
- *Oak recruitment*
- *Valorization of Montado products in the market*
- *Training*
- *Specific policies for the Montado, considering it as a system*
- *Immobility and lack of entrepreneurial spirit*



The Montado is declining, even in Sítio de Monfurado.

Can we do something jointly to prevent this decline? What? Whom?

A thematic network on High Value Farming
Learning, INnovation & Knowledge

LEARNING AREA
« Dealurile Clujului Est »
(Romania)

A BASELINE ASSESSMENT

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Date: June 2017

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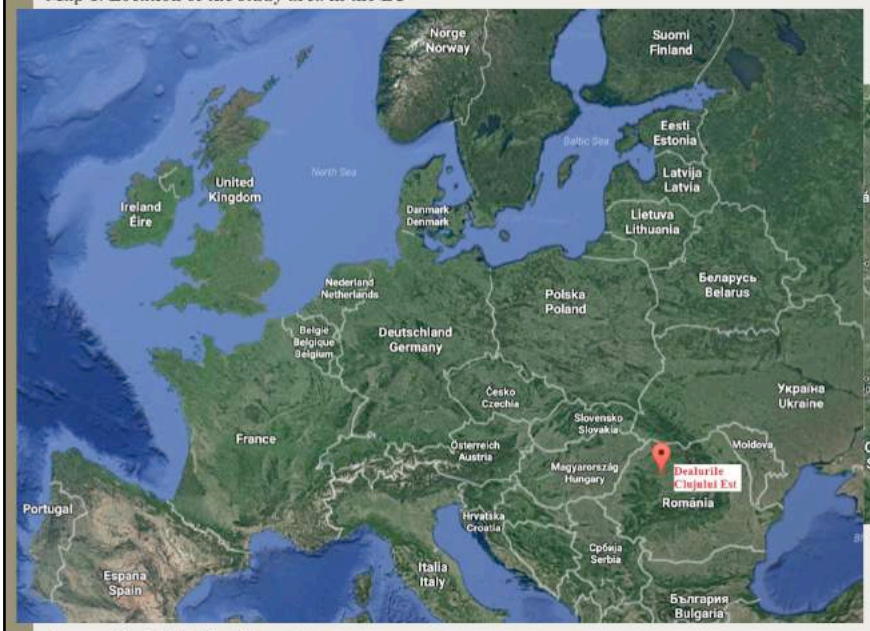
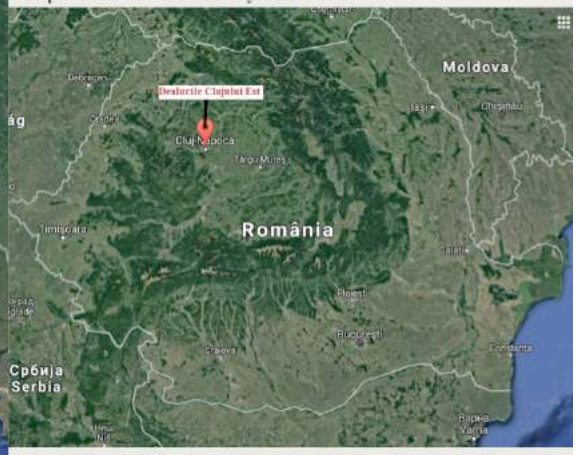
Limits and key characteristics

Map 1. Location of the study area in the EU



Source: Modified after Google Maps;

Map 2. Location of the study area in Romania

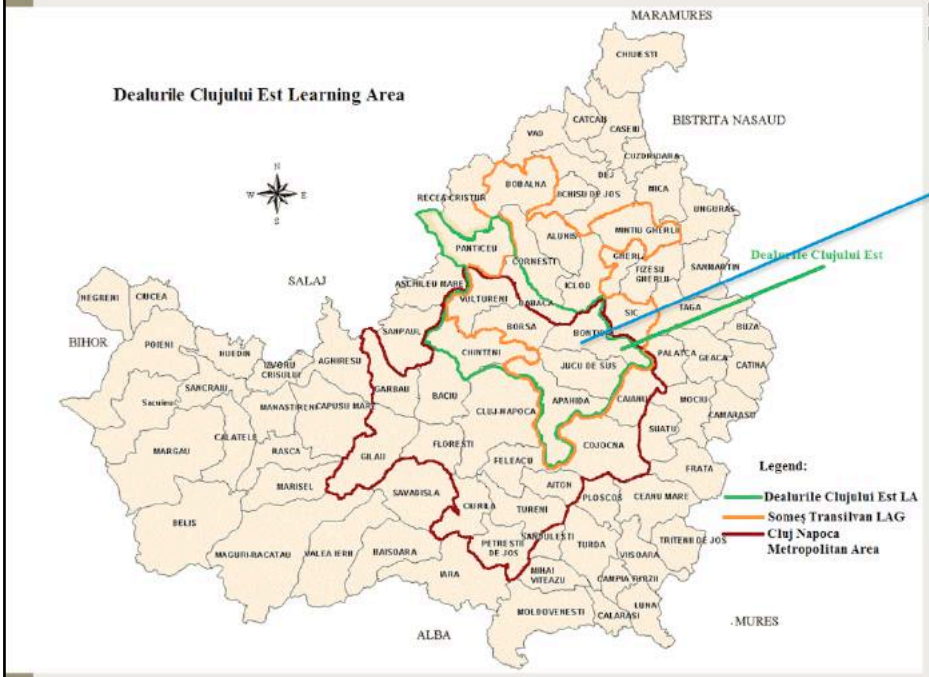


Source: Modified after Google Maps;

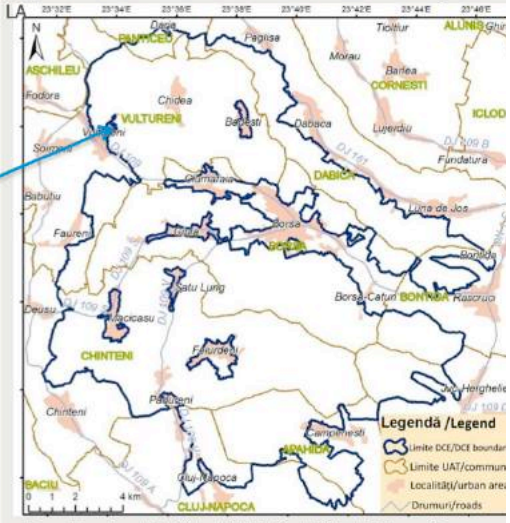
Dealurile Clujului Est learning area (LA) is located in the North-Western Romanian Development region (Map 1). The site is situated in the middle of the Romanian historical region of Transylvania that borders to the North-East with Ukraine and to the West with Hungary (Map 2).

Limits and key characteristics

Map 3. Administrative limits in the learning area



Map 4. Limits of Natura 2000 area in Dealurile Clujului Est LA



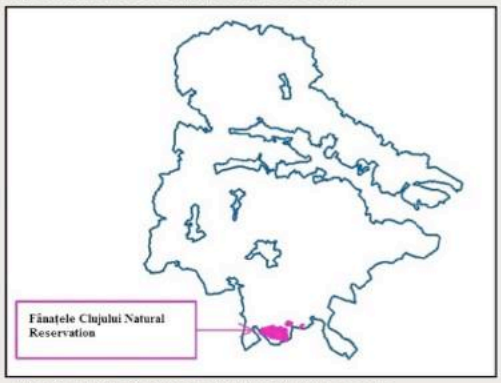
Source: Management Plan Natura 2000 site Dealurile Clujului Est (map 4)

Administratively, the study area is divided into eight communes (Apahida, Bonțida, Borșa, Chinteni, Dăbâca, Jucu, Panticeu and Vultureni) that are located in the peri-urban area of Cluj - Napoca city (321.687 inhabitants in 2016). It is the biggest Transylvanian city in terms of population and GDP per capita (Map 3). A Natura 2000 site is the core of the LA, and has the same name (Map 4). The LA boundaries were set to capture the Natura 2000 site plus surrounding farmland with similar nature values.

The study area also belongs to several local administrative associations. With the exception of two communes (Panticeu and Chinteni), the territory appertains to the Local Action Group (LAG). Panticeu commune is member of Leader Cluj LAG and Chinteni commune currently belongs to no LAG (Map 3). This situation brings inconsistences in terms of good area management. All administrative units, with the exception of Panticeu, belong to the Cluj-Napoca Metropolitan Area. Its strategy acknowledged agriculture as a key objective. Also, it is previewed that the rural areas around Cluj-Napoca can be developed by **promoting local brands** to the urban consumers and by creating **ecotourism facilities** (Cluj-Napoca Metropolitan Area Strategy, 2016). The assessment shows that future HNV innovative programmes have to be incorporated in all these local associative initiatives.

Limits and key characteristics

Map 5. Natural reserve in the Natura 2000 site



Map 6. Limits of Fânațele Clujului Natural reserve

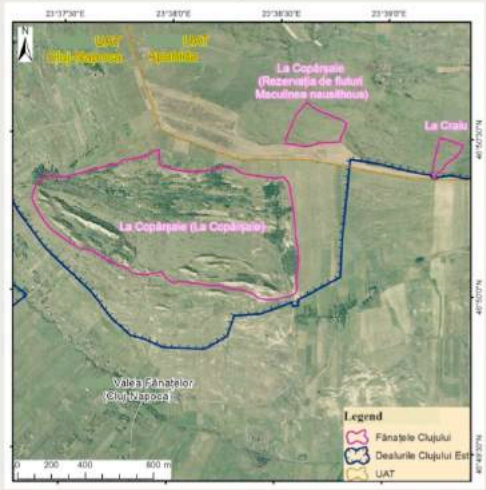


Fig. 1.a. The area in Natura 2000 site in different communes (2011)

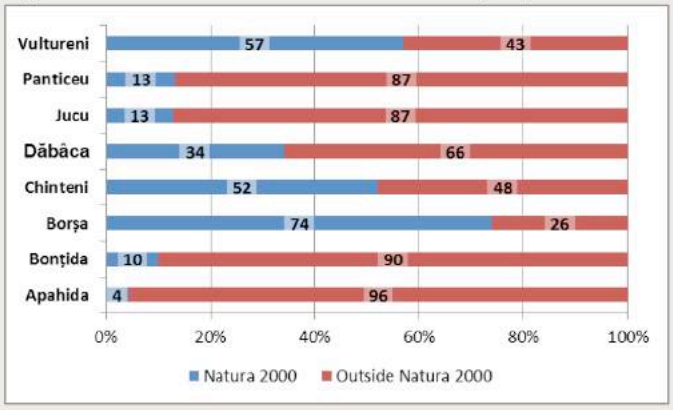
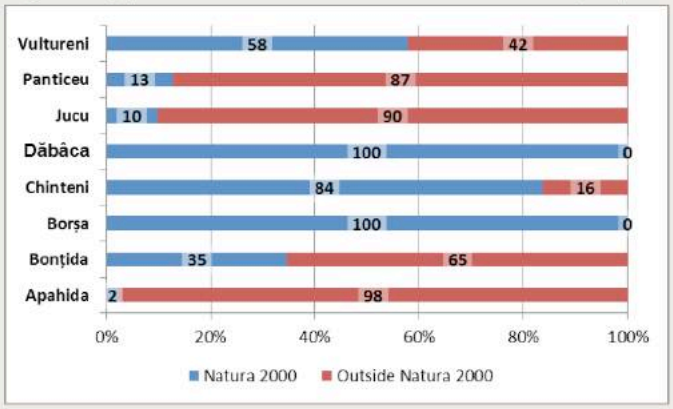


Fig. 1.b. The population share in Natura 2000 site in different communes (2011)



Source: Management Plan Natura 2000 site Dealurile Clujului Est (Map 5 & and data Fig 1.,2).

The study area is recognised for its rich biodiversity. 18,889 ha of the territory formed a Natura 2000 site with the name Dealurile Clujului Est (ROSCI0295) (Ministerial Ordonnance 1864/2007). The Natura 2000 site covers around one third of the territory and population of the communes. The ones with the most important shares of territory under the Natura 2000 commitments are Borșa, Chinteni, Dăbâca and Vultureni (Figure 1.a and 1.b).

The area also incorporates two natural reserves Fânațele Clujului "La Copârșaie" and "La Craiu'' (Map 5). The first one was created in 1932 by the Ministerial Decision no 1149. It increased from 1.5 ha in 1994 to 97 ha in 2004 through the Governmental Decision 2151. Now it covers two protected reservations "La Copârşaie" and "Butterflies *Maculinea nausithous* reservation" (Map 6). "La Copârşaie" is a natural reservation important for botanical, fauna, landscape and geomorphology conservation. It was created to preserve the vegetation elements specific for continental steppe flora. "La Craiu" natural reservation has 2.2 ha and it was created to protect one of the main Romanian plant populations of *Bulbocodium vernum* (Law 5/2000 and Governmental Decision no 2151/2004).

Limits and key characteristics

Fig. 2.a.

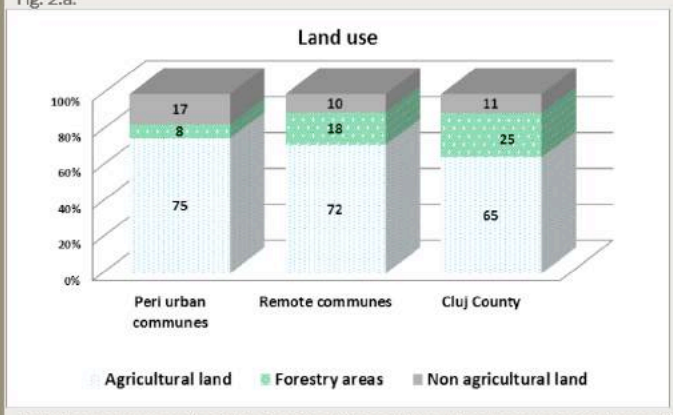
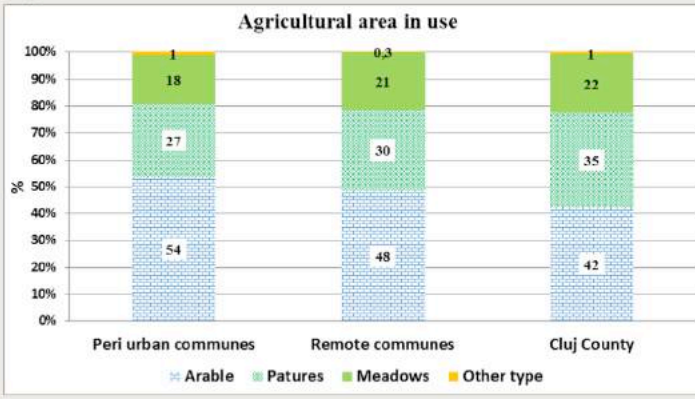


Fig. 2.b.



Peri-urban communes: Apahida; Bonțida; Chinteni; Jucu. Remote communes: Borșa; Dăbâca; Panticeu and Vultureni.

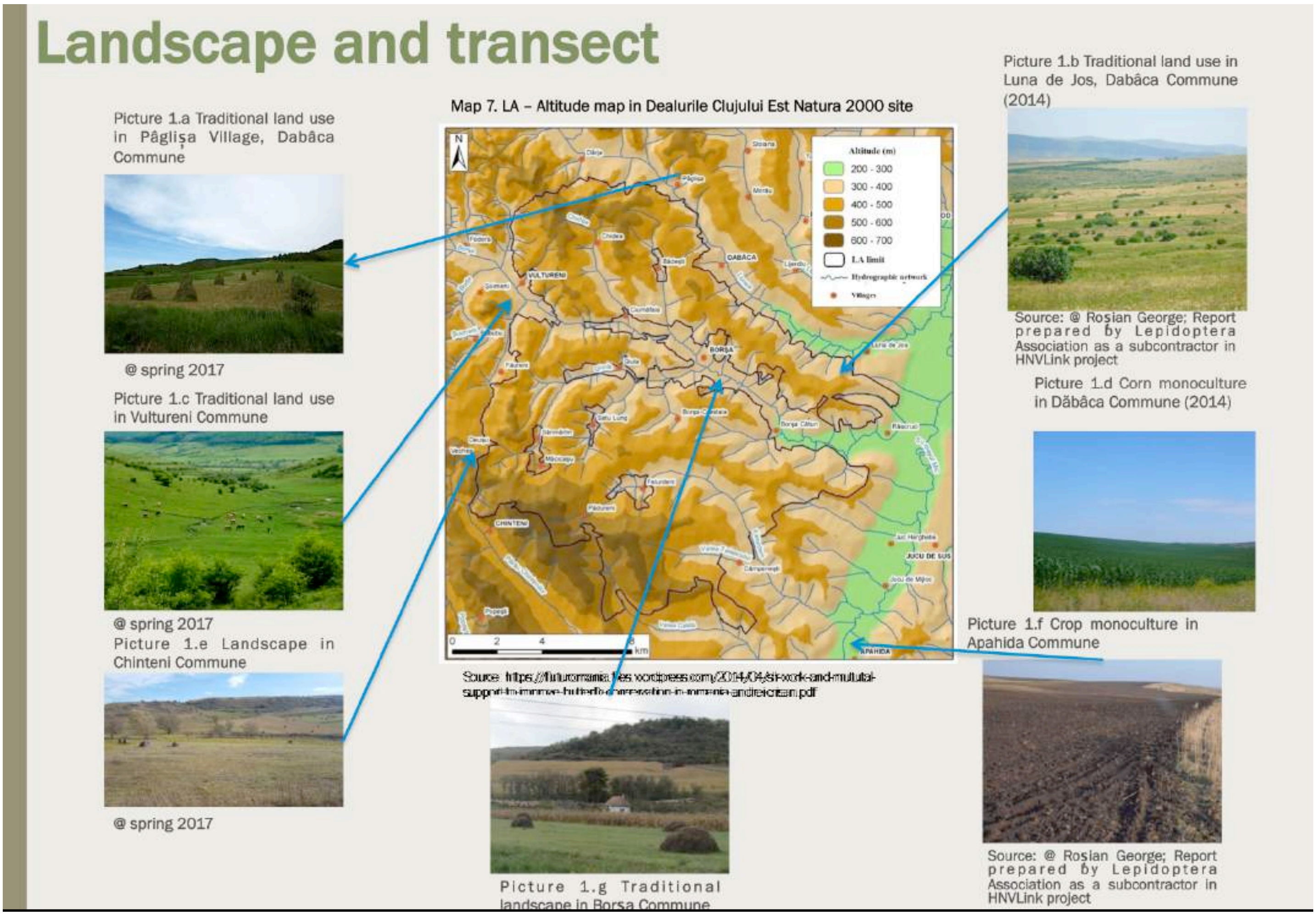
Source: Land use (2014). Romanian National Institute for Statistics (TempoOnline Data Bases).

Tab. 1. Reasons for setting the LA limits

Criteria	
Rural consistency	- rural communities located in the peri-urban area of Cluj-Napoca (biggest Transylvanian city in terms of population and GDP per capita); - similar rural life style, traditions, history etc;
Agro-ecological consistency	- low intensive farming techniques created very important habitats for biodiversity conservation: all 4 *Maculinea buterflies – nausithous, teleius, arion* and *alcon* are present in the same place which is unique in the EU (Rákosy & Vodă 2008); xero-mesophilic meadows on basic substrate holding the world record for the number of species per unit area (Wilson et al 2012); - traditional land use created a mosaic habitat structure - favourable for several protected EU species;
Institutional consistency	- area partially covered by the Somes Transilvan LAG (Apahida, Borșa, Bonțida, Dăbâca, Jucu and Vultureni); - environmental recognised sites: Dealurile Clujului East ROSCI0295 Natura 2000; Fânațele Clujului "La Copârșaie" and "La Craiu" natural reservations;

Agriculture plays an **important role** in the entire LA. The communities located immediately near Cluj–Napoca city (Apahida, Bonțida, Chinteni and Jucu) have more agricultural land resources because they belong to the Someș River Plain area (Figure 2.a). In the same communes there are important roads or constructions sites. On the other side, the remote communes (Borșa, Dăbâca, Panticeu and Vultureni) have more forestry and permanent meadows and pastures areas and less arable land resources (Figure 2.b). The **difference in land use** is explained by the **presence of different altitude layers**. The communes located more than 30 km from Cluj-Napoca, have high altitude hilly shares in the total land area (between 500 and 700 m altitude).

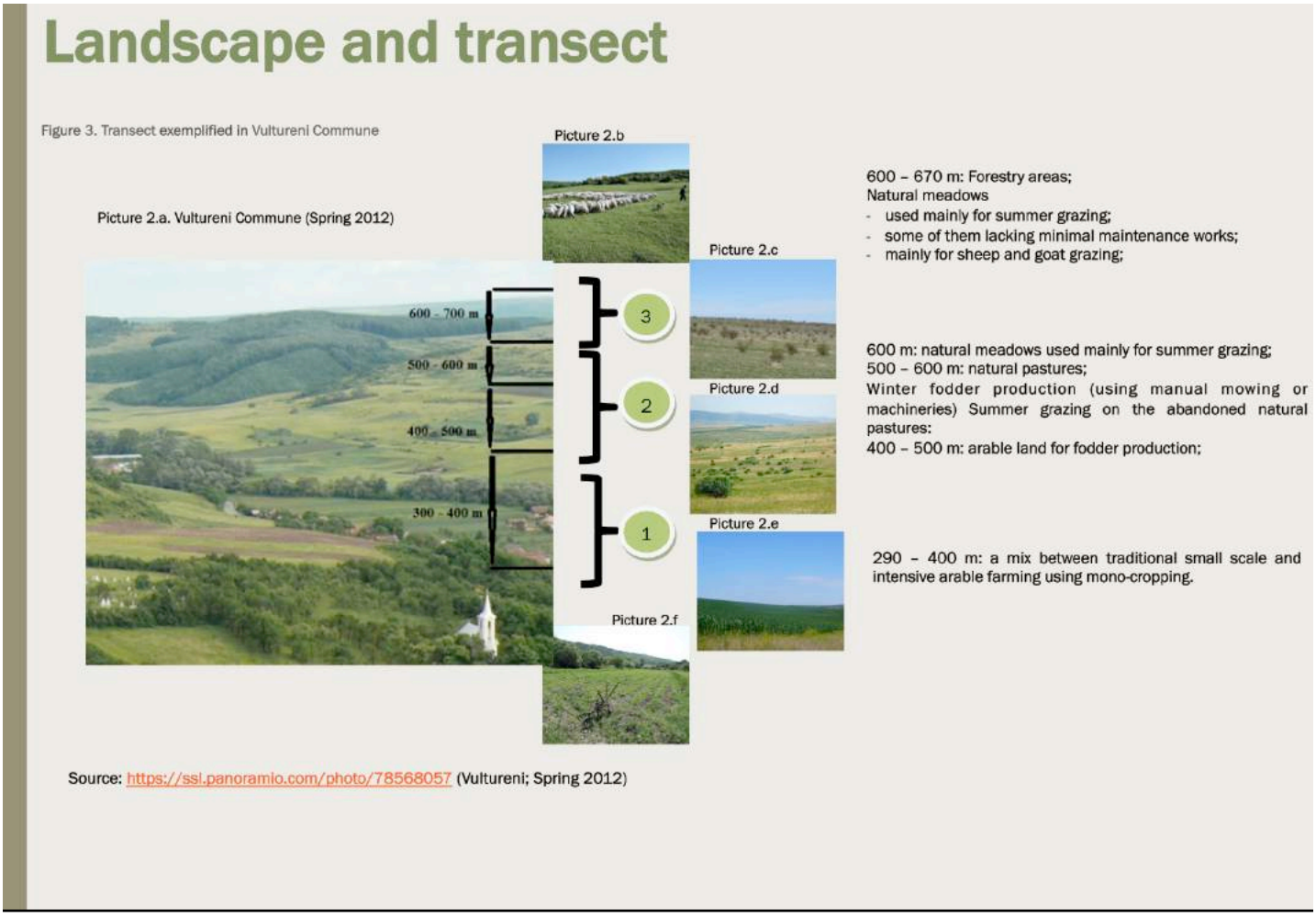
The reasons for setting the LA research limits to the above mentioned administrative units were grouped in several criteria like **rural** or the **agro-ecological consistency** (Table 1). The learning area has at its core a Natura 2000 site with the same name. So, the LA limits, is supported also by the **institutional consistency**.



The landscape is shaped by **geography** and **farming techniques.** There is a network of rivers that flows from North-West to South-East into the Someș River (Map 7). These small rivers formed a string of consecutive valleys that edge the hills no higher than 700 m altitude.

The villages are located on the bottom of the valleys being usually surrounded by arable land situated between 300 to 500 m altitude (Picture 1.d; 1.g; 1.f). The next layer (between 500 to 600 m) is a mixture of arable land with permanent natural pastures and meadows (Picture 1.a). Above 600 m altitude is the area covered with meadows and in some areas with forests (Picture 1.e). **The maximum altitude** is 667 m (Nucului Hill and Peak) in the South- Western part (Chinteni commune) while the **minimum altitude** of 290 m is in the South– Eastern part of the region in the small basin of Someşul Mic river (Bonțida commune). 50% of the area is situated between 300 and 400m altitude.

The specific landscape of the permanent meadows and pastures is probably unique in nowadays Europe (Picture 1.a; 1.b). It is a **mosaic of parcels** that are farmed using different agricultural techniques and in different times of the year. Some parcels are still manually mowed and others are used only for summer grazing.



The landscape is also shaped by the farming techniques (Figure 3):

- **low level altitude** (between 290 and 400 m altitude) is a mix of traditional small-scale (Picture 2.f) and intensive arable farming developed on the land arable resources (Picture 2.e). **Small – scale farming** is using low-intensive traditional techniques that yield mainly for subsistence purposes (specific for the family gardens located immediately near villages). The **intensive arable farming** has developed in the last years after the EU accession. It uses intensive mono-cropping arable farming.

- **medium level altitude** (400 to 600 m) is a **mosaic farming type**. The **arable land** from the lower parts (400 – 500 m) usually concentrated **in average size farms** that are using rather intensive farming practices (Picture 2.e). Some of the arable land is used for fodder production. Small size **natural pastures** areas are still used for **fodder production** using manual or mechanical mowing (Picture 2.d). There is an **abandonment phenomenon** of the low-intensive tradition farming techniques. These types of areas are usually a mixture of grass and shrubs (Picture 2.c).

- **high level altitude** (higher than 600 m) is a mix between permanent natural meadows and forestry areas. Meadows are used for sheep grazing (Picture 2.c). In the last years were noticed a **phenomenon of intensification** (increasing the animal index per hectare) and changes in the flock type (cows were substituted by sheep).

Climate and vegetation

Fig. 4.a. Annual Mean Temperature in Cluj-Napoca (°C) (period 1970-2012)

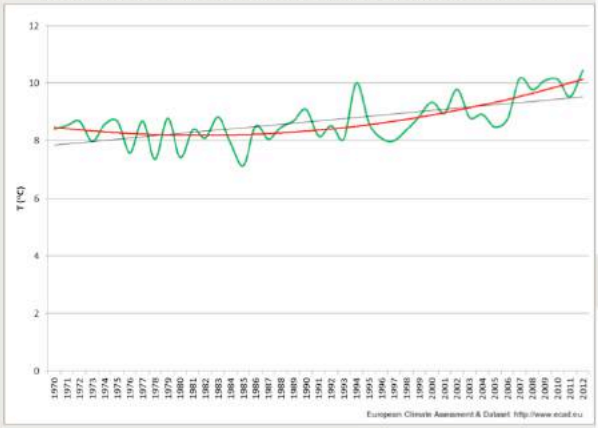


Fig. 4.b. **Yearly** precipitation in Borșa commune, Cluj county (mm) (period 1970-2008)

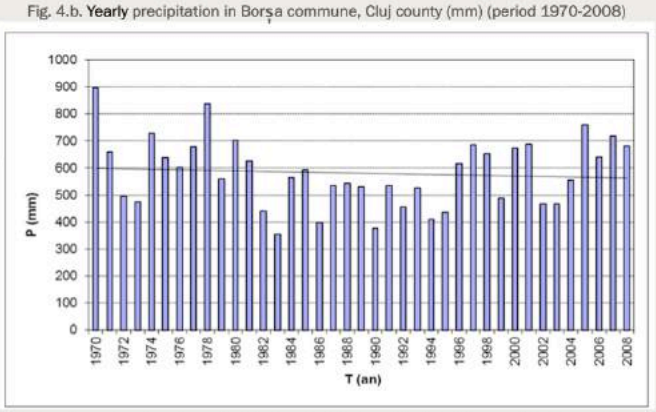
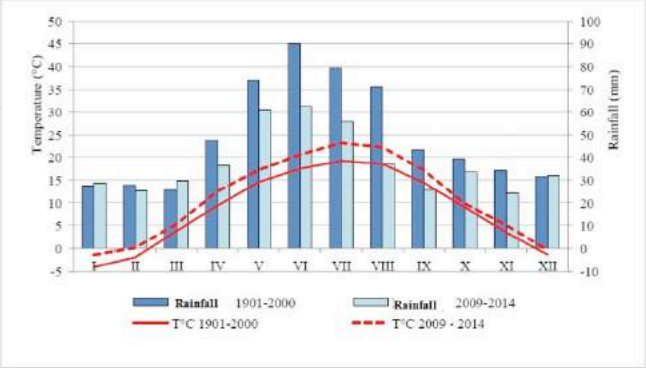


Fig. 4.c. **Average ombro-thermical diagram** for the Transilvania Plain area (Bonțida and Jucu)



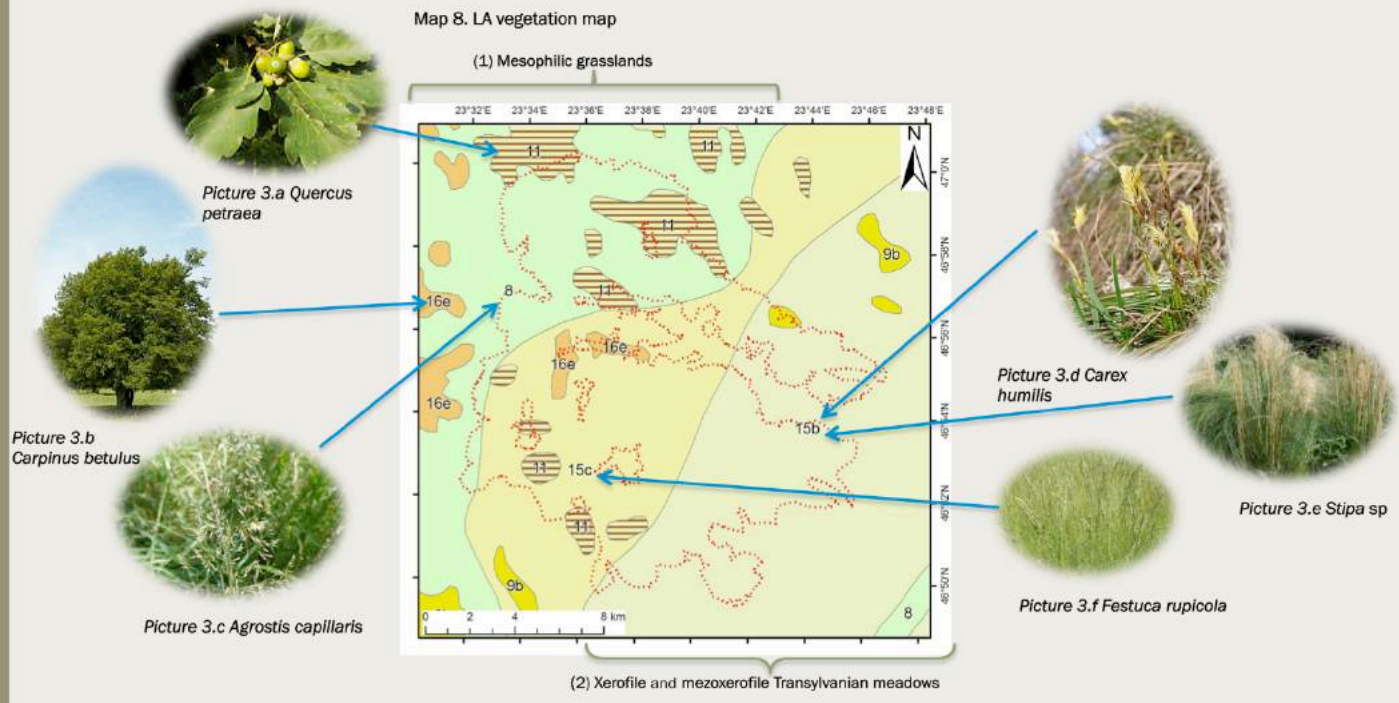
Source: Management Plan Natura 2000 site Dealurile Clujului Est (Figure 3a and 3b); Dinu (2015) Phd Thesis (Figure 3c.)

Climate in Dealurile Clujului Est is **moderate-continental**, being influenced by the Apuseni Mountains located in the South-Western part of the department. The transition from winter to summer is usually in late April, and from autumn to winter in November. Summers are hot and winters usually cold without heavy storms. The average air annual temperature is around 8.5°C.

Climate directly influences vegetation and farming. There exist the need to **produce** and **store forages** for the winter period. **Grazing** the permanent meadows and pastures is possible only in the summer time.

There can be noticed **a steady average temperature increase** over the past years to 9.5°C (Figure 4.a). The average annual rainfall fluctuates around 600 mm/year (Figure 4.b). The **fluctuations** around the average expected rainfall have been **more pronounced** over the last year. The **trend** shows **an increase in the incidence of the draught years** (Figure 4.c).

Climate and vegetation



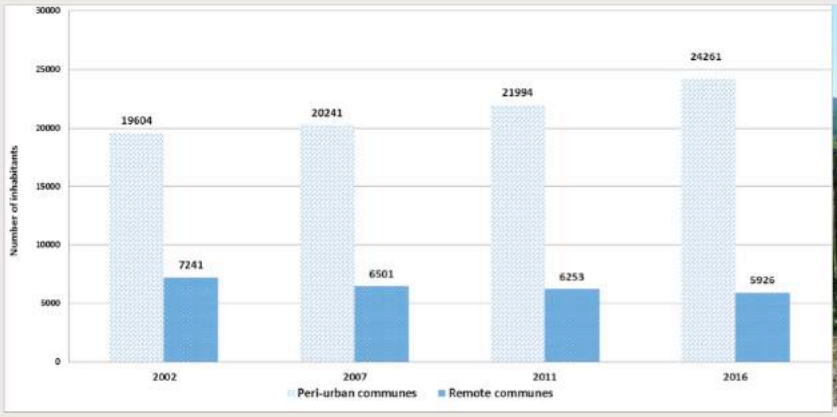
Source (after Doniță and Roman 1979); Report prepared by Lepidoptera Association as subcontractor in the HNVLink project; Pictures Wikipedia.
15b-Xerophilous and meso-xerophilous grasslands with *Carex humilis*, *Festuca rupicola* and *Stipa* sp
15c-Meso-xerophilous and mesophilous grasslands with *Festuca rupicola*, *Agrostis capillaris* and *Brachypodium pinnatum*
8-Mesophilous grasslands with *Festuca rubra* and *Agrostis capillaris*
11-Forests with and *Q. Cerris*
16e-Forests with *Quercus cerris* and *Carpinus betulus*
9b- Forests with *Quercus petraea* and *Carpinus betulus*
Source: Management Plan Natura 2000 site Dealurile Clujui Est (Map 7 and Wiki for picture 3.a to 3.f)

Local botanical studies (Bădărău, 1979) showed that two important ecological areas meet in the area. They separate the grassland habitats into several categories from West to East, depending on the average yearly rainfall that decreases in the same direction because of the relief. The average rainfall is around 650 – 700 mm in the Western hilly area sides and between 600 – 650 mm in the Eastern plain areas (Bonțida, Apahida and Jucu).

Thus, the prevailing Western third site is dominated by **mesophilic grasslands** with *Festuca rubra* and *Agrostis capillaris* (*Festuco rubrae - Agrostietum capiilaris;* Horvat, 1951) (See 1 on the Map 8). In the middle third site of the area predominate mesoxerofile and mesophilic meadows with *Festuca rupicola*, *Agrostis capillaris* and *Brachypodium pinnatum*. In the Eastern part, there are **xerofile** and **mezoxerofile Transylvanian** typical meadows with *Festuca rupicola* and *Stipa* species that corresponds to the priority European habitat 6240 subpanonice steppe meadows (See 2 on Map 8). The area located above 700 m altitude is covered by forest mainly with *Quercus petraea* and *Carpinus betulus*.

Human geography

Fig. 5. Population in the LA (by residence) (2002- 2016)



Source: Romanian Institute of Statistics , 2017.

Picture 4. Traditions in the area

Source: http://www.dejeanul.ro/content/traditia-cluj, 2015

- The number of inhabitants decreased especially in the communes located more remote from Cluj-Napoca city: Borșa, Dăbâca, Panticeu, Vultureni (communes with high HNV resources).
- Aging population is more intense in these communes.
- Public transportation is not available in the remote area communes (only private mini-buses).

In four communes out of eight (Borșa -34 km, Dăbâca-39 km, Vultureni- 31 km, Panticeu- 53 km from Cluj-Napoca) located relatively far from Cluj-Napoca city there was an important decreasing trend for the number of total inhabitants. In the other four communes the inhabitants number increase is explained by **the dormitory function** of the communes for the active population that work in Cluj-Napoca (Apahida – 10 km, Chinteni – 10 km), as well as their **positioning near the industrial parks** and the National Road DN1 (Jucu – 20 km, Bonțida – 30km) (Figure 5).

Nevertheless some of the population still preserves the outstanding traditions especially during the most important religious holidays (Picture 4). Traditions are kept mostly by the elder persons. There is also a traditional dance formation in the region.

Human geography – demographic momentum

Fig. 6.a. Natural growth in the LA area (1990 – 2015)

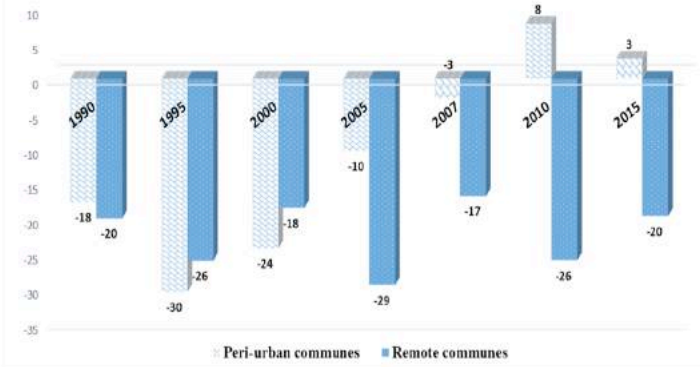
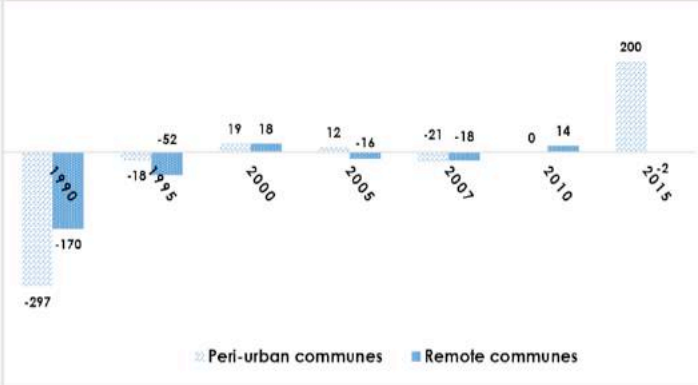


Fig. 6.b. Migration rate in the LA area (1990 – 2015)



Source: Romanian Institute of Statistics , 2017

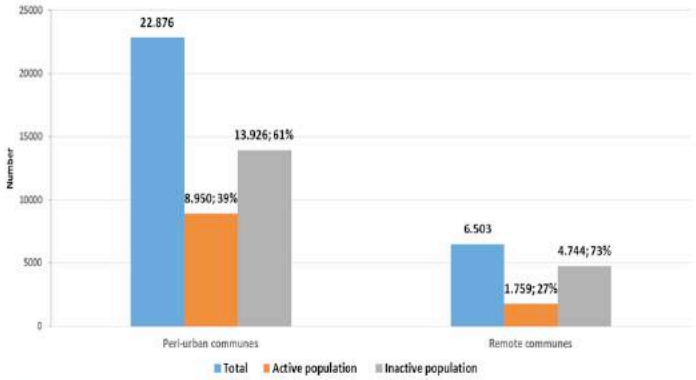
- Natural growth is negative in all communes, (except Apahida), as a consequence of the aging population;
- Only Panticeu (-24) and Vultureni (-2) have had negative migration rates over the past years.

The **main human geographic characteristics are aging population, cultural and ethnic diversity.** Perspectives are not very optimistic after analysing the evolution of natural growth. Thus, the communes from the peri-urban area registered positive natural growth rates in the last years (mainly Apahida commune). All other communes recorded **negative increases in population growth** (Figure 6.a). The Apahida exception is explained by the fact that a lot of young active population working in Cluj-Napoca moved in that area due to low real estate prices.

External migration from rural areas is still difficult to quantify. Official statistical data only provide information on registered emigration, however the amplitude of the phenomenon is likely to exceed these official data. For the 1990-2000 period, internal migration presents a predominantly **rural-urban trend** (Figure 6.b). Over the past recent years, the trend has diametrically changed in **urban-rural direction**. Only for the remote communes the migration rate still has negative values.

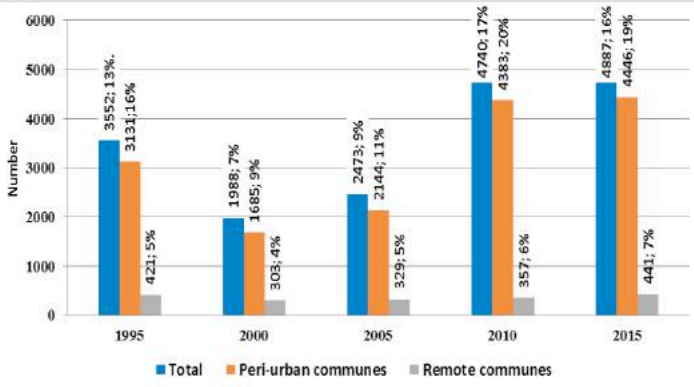
Human geography – economic and demographic momentum

Fig.7.a. Active and inactive population in the LA (2011)



Source: Romanian Population and Housing Census, 2011

Fig.7.b The comparative situation of the number of persons employed in the area (1995 - 2015)



Source: Romanian Institute of Statistics (TempoOnline Data Bases).

- The highest shares of inactive population are recorded in the communes located relatively in remote areas (Panticeu: 76%; Vultureni: 76% and Dăbâca: 74%).
- The active population does not exceed 50% of the total population in any of these localities. This is primarily due to the large share of retired persons.

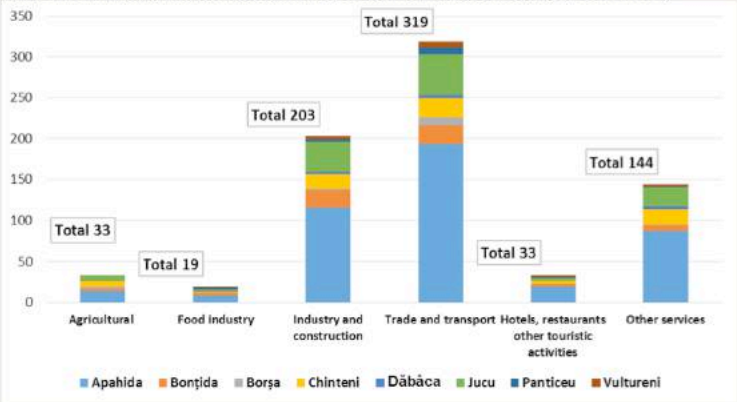
The **occupancy rate** shows that an important population share is represented by the **inactive group**. The highest shares are recorded in the communes located relatively far from cities. This is primarily due to the large share of retired persons (Figure 7.a).

The economy is in different development stages and has experienced different evolutions over time. The highest degree of development is shared by Apahida and Jucu communes (peri-urban communes), that have more than 1500 employees each (Figure 7.b). These two communes host two important Industrial Parks for Cluj County where people from the whole area could find a job (Tetarom III Industrial Park and Nervia Industrial Park). Within these facilities operate multinational companies (De'Longhi SRL, Robert Bosch SRL, Karl Heinz Dietrich International Exped SRL, Imperial SRL, Star Storage SRL, Henschel Romania SRL, IL Caffe Servexim SRL, Contrast Import Export SRL etc) specializing in the production of household appliances, automotive production, general mechanics operations, logistics or IT data centers.

By contrast, the **economic situation** in Borşa, Panticeu and Vultureni **is precarious.** There is a small number of employees who earn incomes from a paid job. **These are also the areas that have the most important HNV farming areas.** Moreover, the share of the employed persons in the total population is very small especially in the communes located far from cities (Figure 7.b).

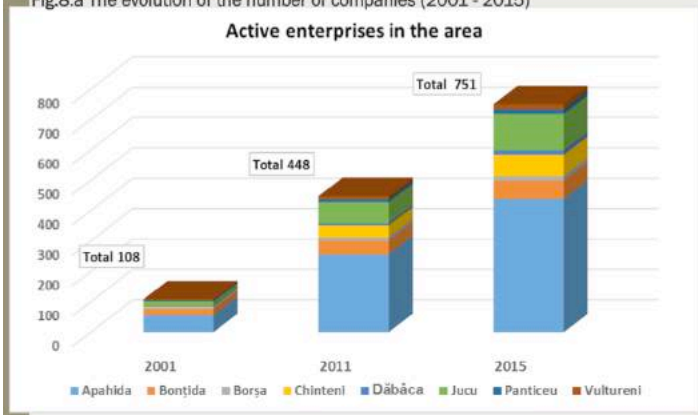
Human geography – economic and demographic momentum

Fig.8b The number of companies according to the main object of activity (2001 - 2015)



Source: Romanian Institute for Statistics (TempoOnline Data Bases).

Fig.8.a The evolution of the number of companies (2001 - 2015)



Source: Romanian Institute for Statistics (TempoOnline Data Bases).

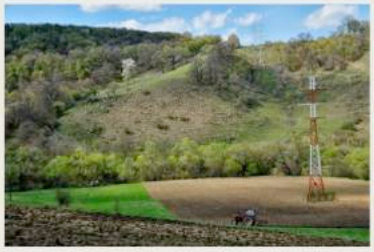
The number of companies multiplied by 7 among 2001 and 2015 (Figure 8.a). The most important number lies near the Cluj-Napoca city (in Apahida and Chinteni) and near the big infrastructure roads (Bonțida and Jucu). Poor entrepreneurial activities are present in the remote HNV area of Vultureni, Panticeu, Dăbâca and Borșa.

The analysis of the number corresponding to the registered companies according to their main object of activity shows **low entrepreneurial results especially for Agriculture and Food Industry** (Figure 8b). In this area farmers mainly operate as individual persons being included in the Register of Agricultural Holdings. They have rather low obligations for sanitary-veterinary authorization comparing with the commercial companies. These demands are even more challenging when authorizing a food processing company. This is the main impediment for the development of small food processing industry.

Human geography - "users" of learning area

- The inhabitants from Apahida, Bonțida, Borșa, Chinteni, Dăbâca, Jucu, Panticeu, Vultureni; The Natura 2000 site covers around one third of the territory and population.
- Farmers or other people outside the communes owning or renting land in LA;
- People working in the area or having a business in the LA;
- Tourists or visitors in the learning area;
- Researchers and students from various fields of study: environment, biology, agriculture, history, economics etc.

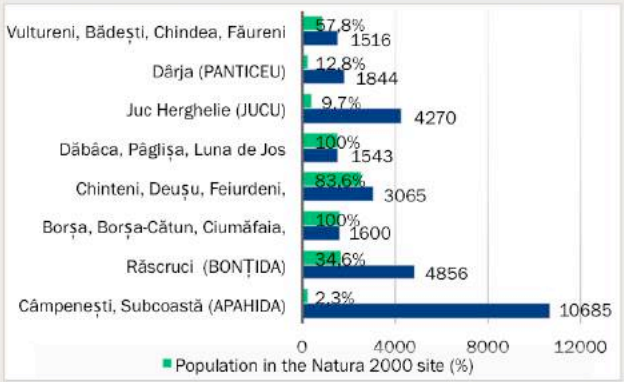
Picture 5.a. Farmers – the users of the area



Source: http://www.lepidoptera.ro/evenimente.htm

Picture 6.b. Researchers – the users of the area

Fig. 9. Population in the Natura 2000 Site Dealurile Clujului Est

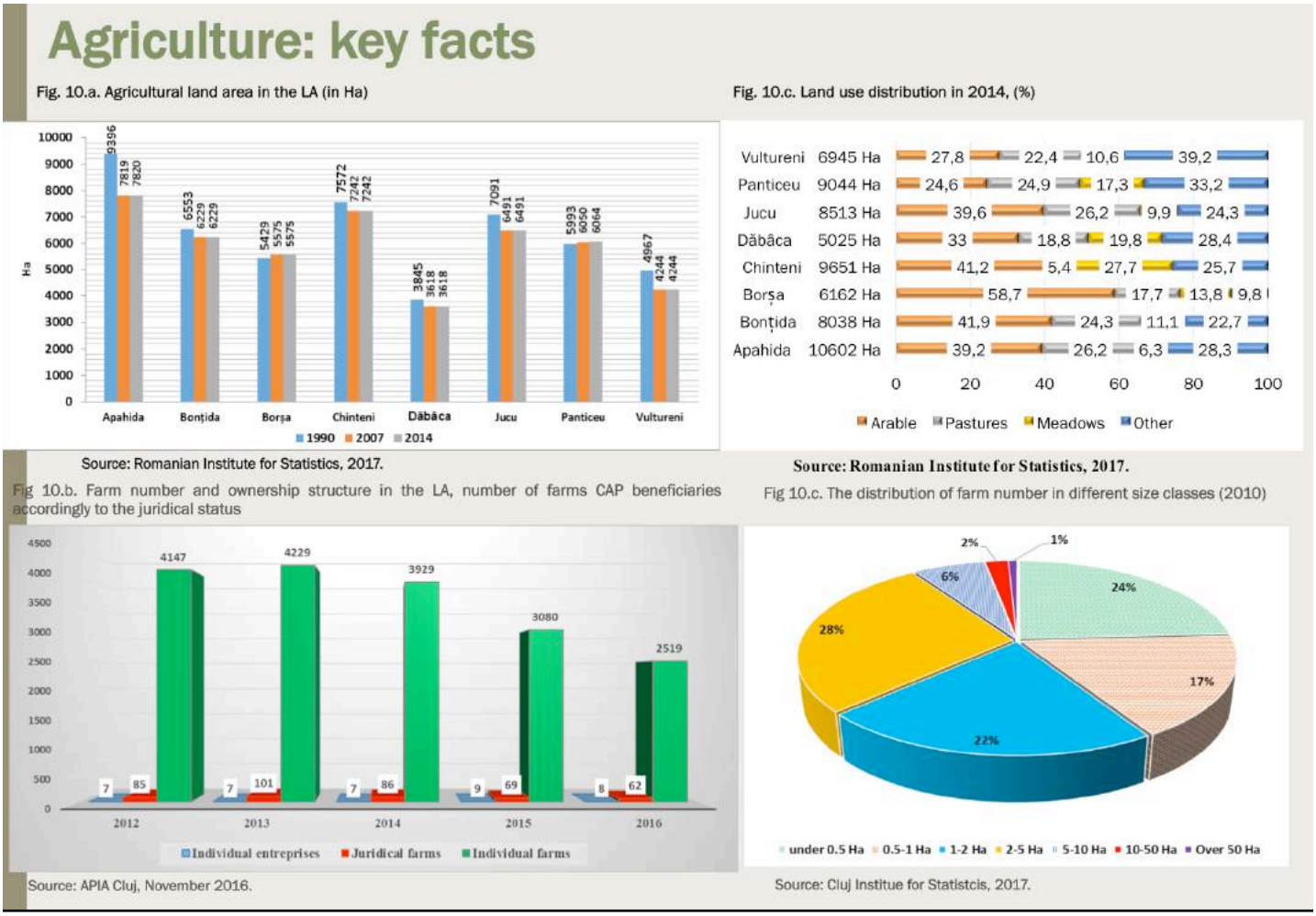


Source: Romanian Institute for Statistics , 2017

Other main users of the area are:

- The Natura 2000 site covers around one third of the territory and population (Figure 9). They, together with the other local inhabitants, are the main users of the learning area.
- Small subsistence household or specialised farmers working the land;
- Other people outside the communes owning or renting land in LA, people working in the area or having a business in the LA.
- Researchers and students from various fields of study: environment, biology, agriculture, history, economics etc.
- Local business;

The studied area, unlike other areas in the country, does not have a **tradition in tourism**. Activities that may be included in the notion of tourism are: fishing, hunting or horse races organized by nobility on their fields, attending saltwater ponds whose existence and source of recreation and treatment had been known since Roman domination times (Loşonți et al., 2014, p. 192). Events (not many) organized after 2000 year: folk dances, concerts, theatre, presentations of old historical films, exhibitions of old, traditional objects (machines, agricultural tools etc.), which represent a few small steps in the field of tourism development in the area of Dealurile Clujului Est.



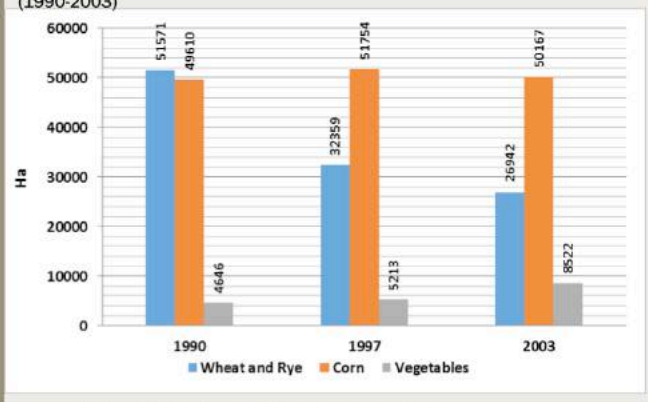
Comparing with 1990 data, the agricultural land in the Learning Area has gradually decreased with 7% due to a reduced interest of small owners to work the land. The most affected communes are Apahida (-17%) and Vultureni (-15%) (Figure 10.a). However, in recent 15 years, the trend changed. The most significant increases compared to 2000, were registered in Panticeu (+16%) and Borșa (+9%).

Individual farms represent the main land users. 2519 individual farms benefited from CAP subsidies in 2016, while only 62 farms with legal status received such subsidies (Figure 10.b). 50% of farms had less than 1 ha in 2010 being not eligible for CAP subsidies (Figure 10.c). A large part of these individual farms practice subsistence or semi-subsistence agriculture on small areas, with the most rudimentary techniques, often for the benefit of their own household consumption.

There are no official statistical data available to the researchers regarding the size of individual farms. While, according to the Ministry of Agriculture, the average size of a Romanian farm was 3.7 ha in 2016, the research conducted by Paulini et al. in 2011, in the municipalities of Borșa and Dăbâca revealed that the average size of individual farms was approximately 6.5 hectares, with an average number of 9 plots/farm.

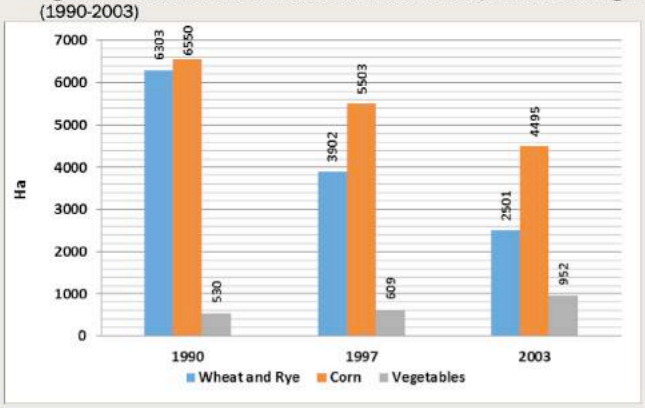
Agriculture: production, productivity and markets

Fig. 11.a. Evolution of the main areas cultivated with crops in Cluj department (1990-2003)



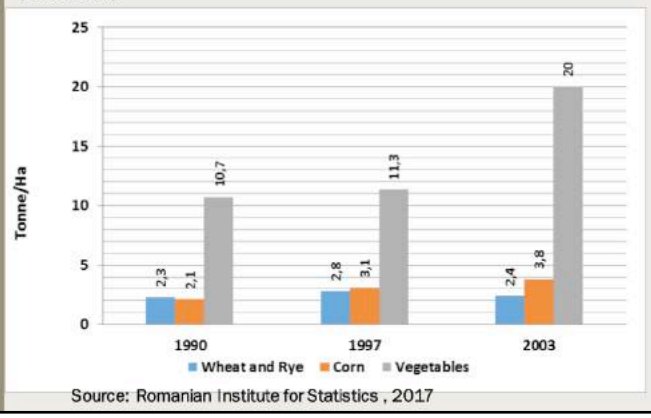
Source: Romanian Institute for Statistics , 2017

Fig. 11.b. Evolution of the main areas cultivated with crops in the Learning Area (1990-2003)



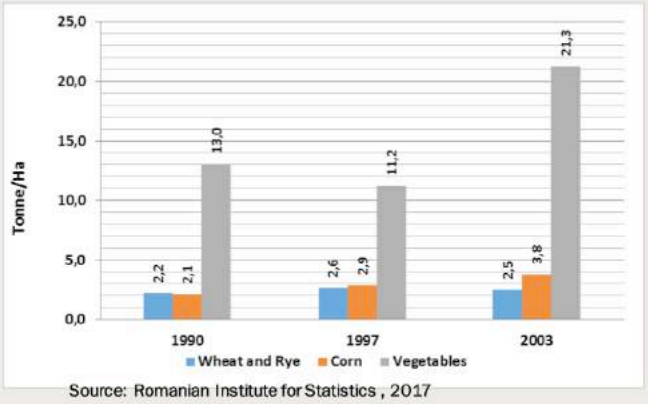
Source: Romanian Institute for Statistics , 2017

Fig. 11.c. Evolution of average yields of the main crops in Cluj department (1990-2003)



Source: Romanian Institute for Statistics , 2017

Fig. 11.d. Evolution of average yields of the main crops in the Learning Area

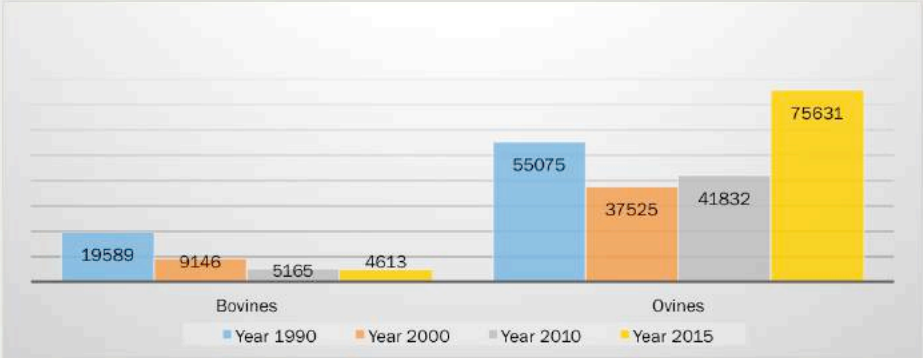


Source: Romanian Institute for Statistics , 2017

The **main crop productions** are wheat, maize, fodder plants and other crops. During 1990-2003, the cultivated area has decreased, with the exception of the vegetables both in the LA but also at the departmental level (Figure 11 a and b). There are no important differences in terms of average yields per hectare in the LA compared with the average departmental figures (Figure 11.c and b). Nevertheless, the average yields are extremely low as compared with the EU average figures (e.g. around 6 tonnes per hectare in the EU in 2016).

Agriculture: Production, productivity and markets

Fig 12. Main livestock resources (1990 to 2015)



Source: Romanian Institute for Statistics , 2017

Picture 6.a. Local markets and events

Picture 6.b. Local fairs

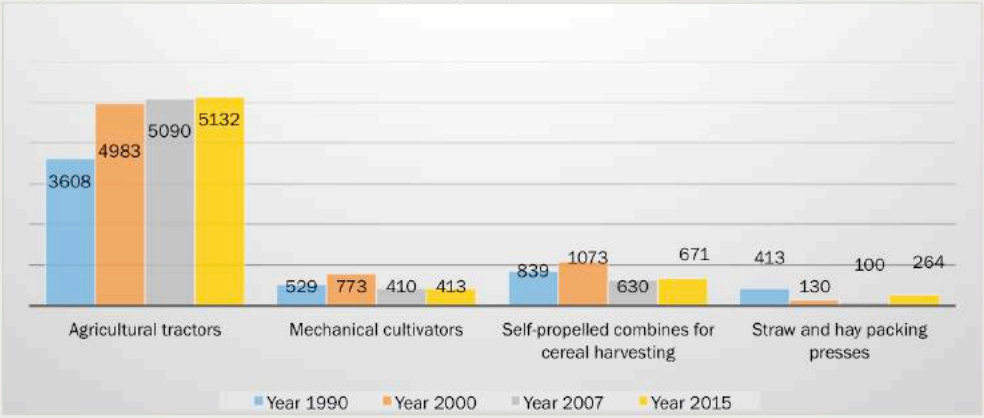
Given the structure of farmland and the specific traditions, **sheep breeding** was and will remain one of the basic activities. There is an important increase for the sheep number (37% between 1990 and 2015) (Figure 12). This is explained by the **changes in the technical farming process**. The sheep flock is now kept almost all year long on the permanent meadows and pastures for grazing. Forages are provided only around the parturition period. Cows breeding became more expensive because winter stabling is a must. An increased number of sheep livestock can potentially harm the HNV area due to overgrazing and erosion phenomena.

The quantity of both crop and animal **household production sold on the market is very small**. There are the following options:

- direct sell in food markets and fairs – there are few markets and fairs in most of the communes; the important fairs are in the cities – the cost of transportation is a barrier for small farmers;
- supermarkets - the price obtained is very low, the quantities required are important;
- selling to industrial processors - very few processors in the area; they prefer to import cheaper and often poor quality products;
- through small shops- there are no such shops with local products in most of the areas, there is a lack of local brands which can attract new consumers.

Agriculture: Main production factors used

Fig 13. Park of tractors and agricultural machinery in Cluj County



Picture 7.a. Production factors Source: National Official Statistics, 2017

Picture 7.b. Țurcana local breed

Picture 7.c. Bălțată Românească local breed

Compared with 1990's data, in the last 15 years, there has been an increase with 42% for the number of tractors that exit in the entire department (Figure 13). There are no official data about the number of machineries in the LA region. After a qualitative assessment in the LA region it was found that in the last years, due to the second CAP pillar programs, some of the farmers invested in new farming techniques. Thus, especially the **commercial farms** are now equipped with all necessary farming equipment. On the other side, the **individual farms** that could not apply for CAP investment programs due to their low size level are still using **low intensive farming techniques**. Some of mechanical works from the individual farms are provided by rented equipment. The local individual producers are using mainly local breeds as "țurcana" sheep and "bălțata românească" cow breed.

Agriculture– farming systems

Picture 8.a. Relatively intensive crop farming practicies

Photo: Crop production in Panticeu village, 2017 @ Mihai Valentin

Picture 8.b. Traditional sheep breeding farming practicies

Photo: Sheep breeding in Chinteni village, 2017 @ Mihai Valentin

Picture 8.c. Traditional crop farming practicies

Photo: Traditional crop farming practicies in Dăbâca commune, 2016 @ Mihai Valentin

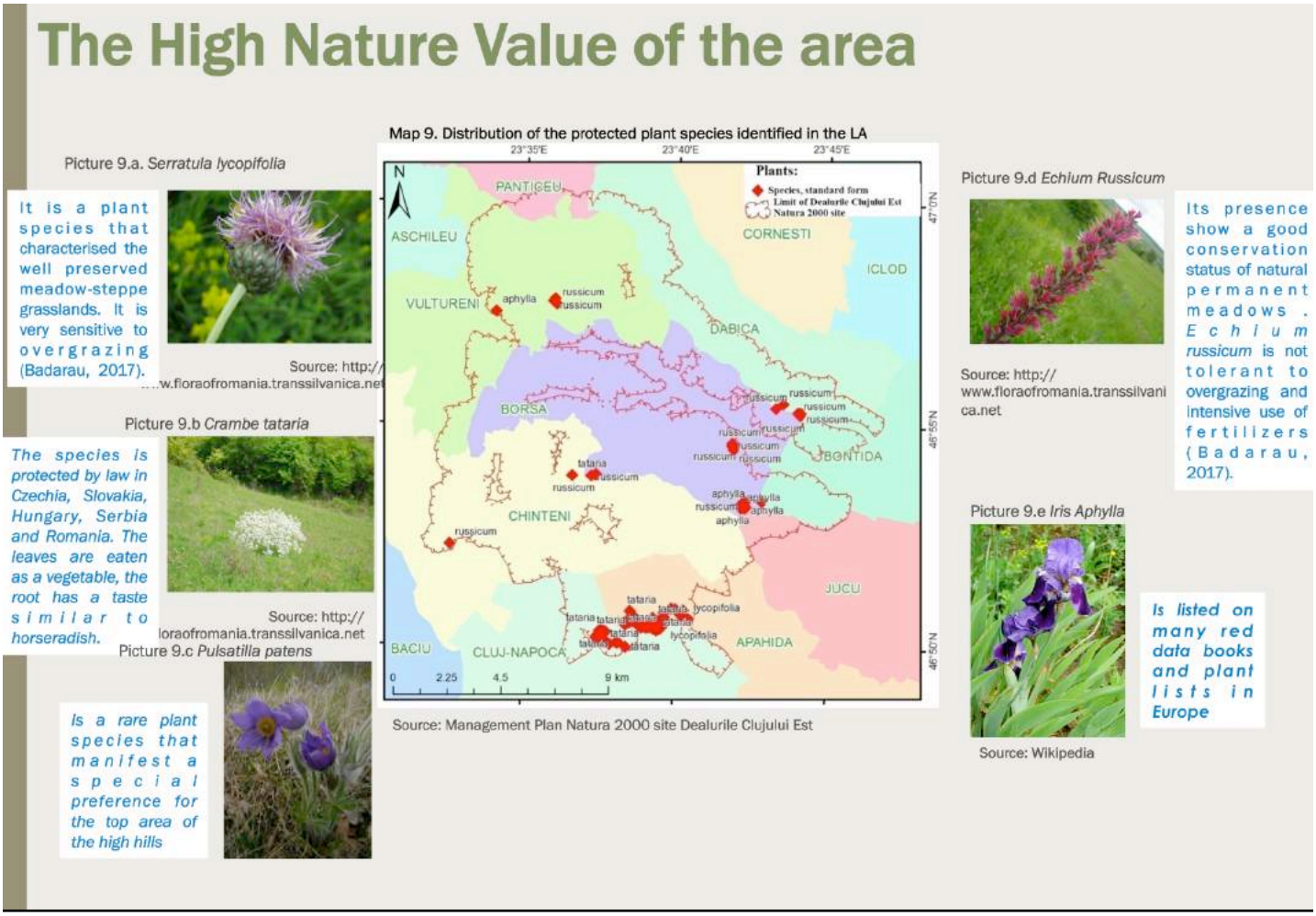
Picture 8.d. Relatively intensive breeding farming practicies

Photo: Dăbâca commune, 2016

- The economic activity in most of the analysed communes is focused around agricultural practices.
- Only in the communes in the proximity of Cluj-Napoca city and on the National road DN1C (Apahida, Chinteni, Jucu, Bonțida) - a wider range of non-agricultural activities can be identified (Industrial Park Tetarom from Jucu; Industrial Park from Apahida)

The **farming systems** can be divided in two groups. The **individual small size households** (below one hectare of land and less than two mother cows or 25 sheep) are producing mainly for their own consumption. Low-intensive mix farming activities are present in almost all households from the region. After a qualitative assessment, such activities are applied nowadays only on about 20 to 25% of the entire agricultural land. The young generation is migrating to cities or to other EU countries. Such practices are based on extensive labour forces and they produce rich biodiversity habitats (due to manual mowing and low grazing indexes) (Picture 8.b and 8.c).

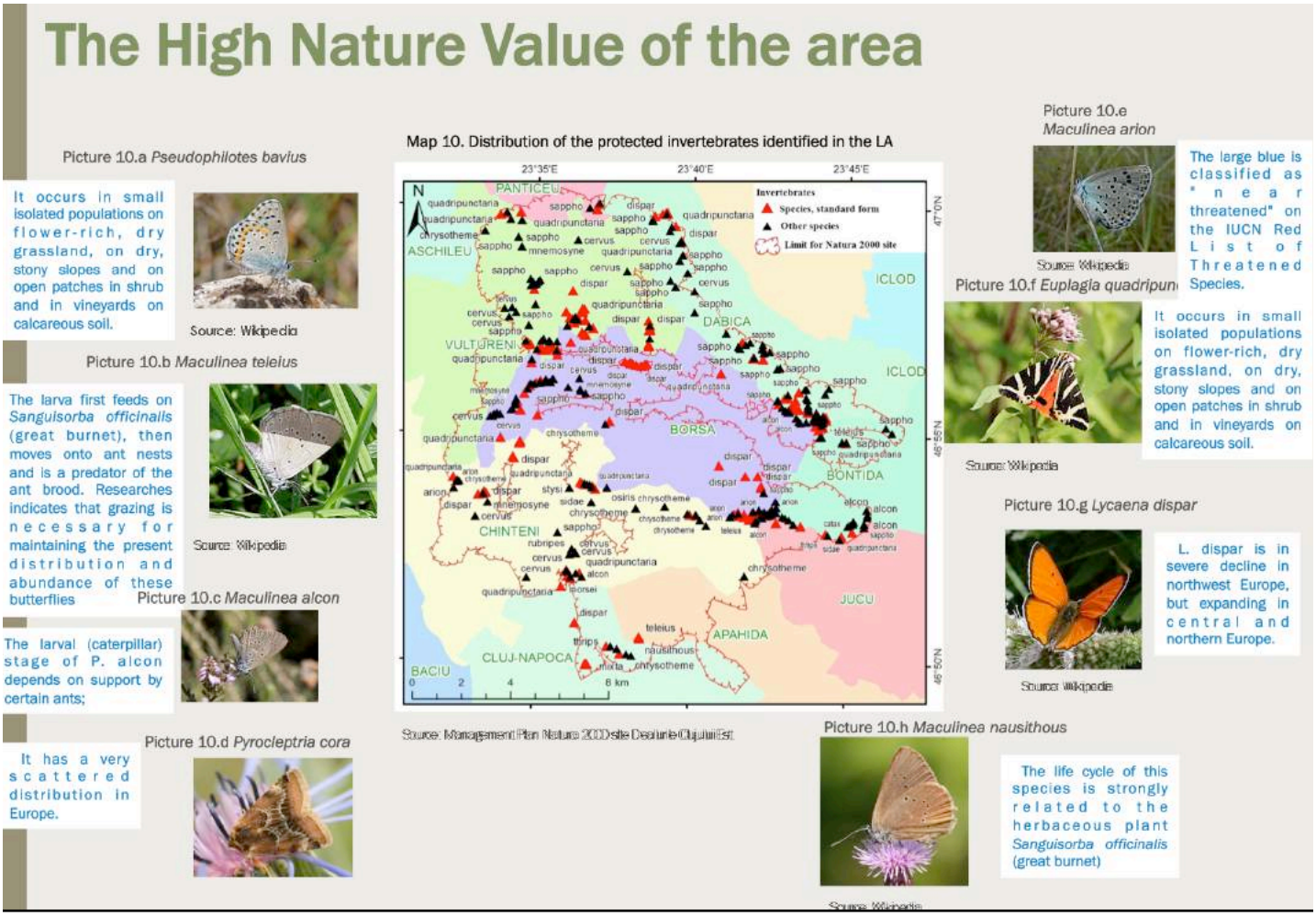
Commercial farming is developed by several households that had access to information and funding (from commercial banks or from EU CAP programs) or by newcomers. In the early 2000 years, large areas of permanent meadows and pastures but also some of the arable areas were abandoned by their landowners due to the capital lacks. After implementing the CAP subsidies system (especially the payments coupled per flock head) some of the common land was grabbed by newcomers. They created big size sheep farms that are using the permanent meadows and pastures for grazing all around the year. There is a special agri-environment payment to support low intensive farming practices (from the second CAP pillar) but its support level and also the environmental demands are considered to be less attractive comparing to the direct coupled payment system (around 10 Euro per sheep head). Overgrazing and erosion are the main negative effects of such new systems that might affect the biodiversity resources. On the other hand, the crop production intensified applying now highly intensive technologies (mono-cropping) (Picture 8.a). Finally some of the commercial farms are applying a mixt between the intensive and low-intensive techniques (Picture 8.d).



The region is recognised for its rich biodiversity on the permanent natural meadows and pastures. The outstanding biodiversity is explained by the low – intensive traditional farming techniques applied from generation to generation. They presume the use of extensive labour force in all farming activities, with no chemical inputs as fertilisers and pesticides.

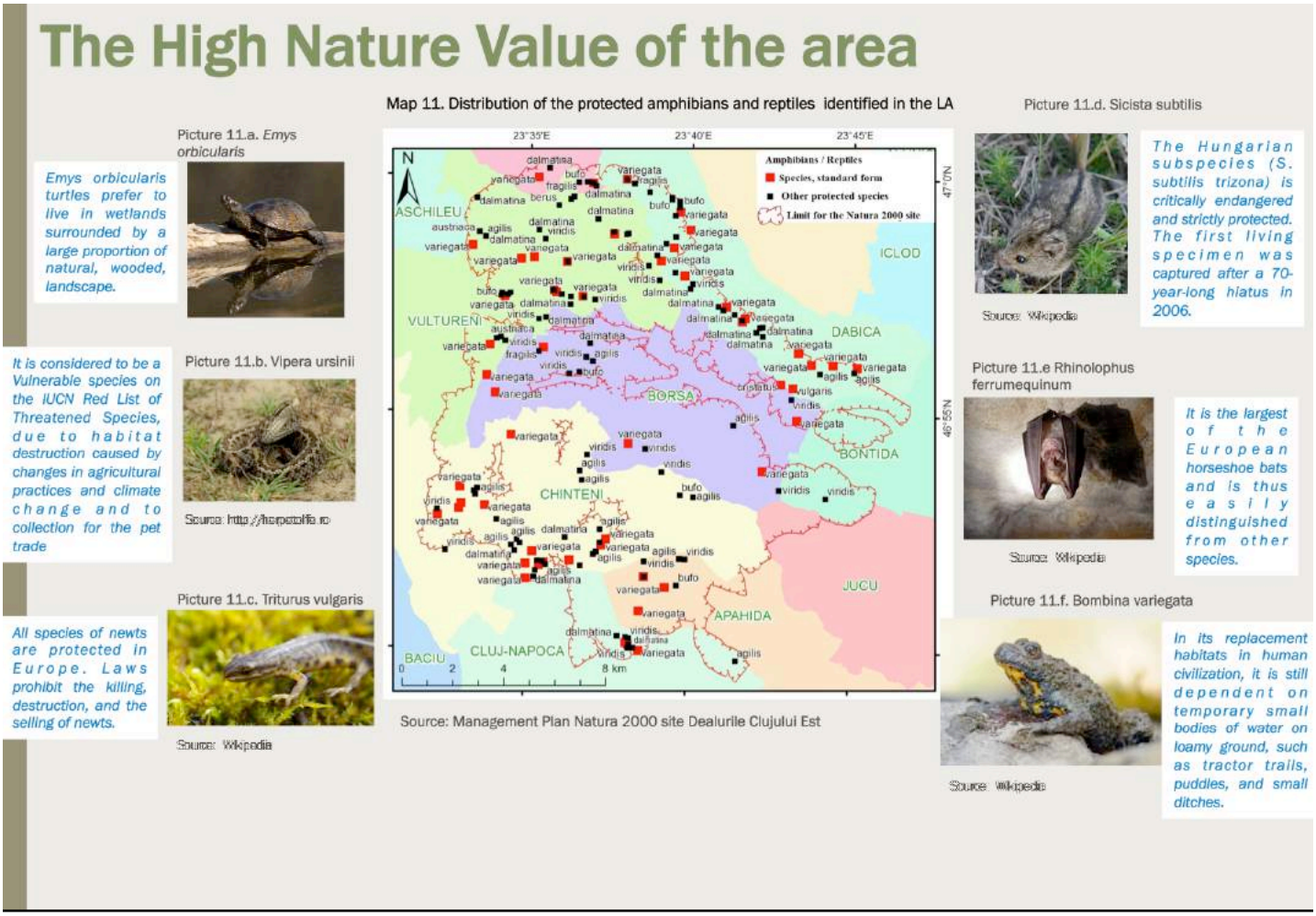
Several botanical studies showed the existence of **282 different vascular plants** that characterise the spontaneous flora of the permanent natural meadows and pastures (Management Plan, 2016). Some of them are listed among the **priority species** under the EU "Habitats" Directive (Council Directive 92/43/EEC/1992). More precisely, five plant species are listed in the annexes of the EU Habitat Directive being considered endangered species in Romania:

- *Serratula lycopifolia* (Picture 9.a) is located mainly in the South– Eastern part of the LA in the recognised natural reservation “La Copărșaie” (Map 9). It is a plant species that characterises the well preserved meadow-steppe grasslands. It is very sensitive to overgrazing (Badarau, 2017).
- *Crambe tataria* (Picture 9.b) is protected by law in Czech Republic, Slovakia, Hungary, Serbia and Romania. The leaves are eaten as a vegetable and the root has a taste similar to horseradish (Hoskovec, 2014).
- *Echium Russicum* (Picture 9.c) is presented on extended areas on the permanent meadows and pastures from the centre part of the study area. It is also an indicator for well-preserved natural meadows;
- *Pulsatilla patens* (Picture 9.d) is a rare plant species that manifests a special preference for the top area of the high hills.
- *Iris aphylla* (Picture 9.e) is listed on many red data books and plant lists in Europe



Systematic **lepidopterological research** has been carried out in the area since the early '60s. In 1997, a list of macrolepidopters identified in the Natural Reservation Fanatele Clujului area was compiled and published based on all available information (literature and researchers' collections). The list includes no less than 608 species (including nocturnal species), some of which are rare and/ or endemic (Rákosy and Lászlóffy, 1997). Ten of them are listed in the annexes of the EU Habitat Directive: *Lycaena dispar; Cucullia mixta; Callimorpha qadripunctaria* – priority species ; *Catopta thrips; Nymphalis vaualbum* – priority species; *Pseudophilotes bavius; Leptidea morsei; Maculinea nausithous; Maculinea teleius. Coleopter: Pilemia tigrina*;

This **rich biodiversity** is primary due to the **floristic diversity** that characterises the permanent meadows and pastures. The floristic diversity was reached by generations and generations of farmers that applied low intensive farming techniques (no chemical inputs and extensive labour force). So there was a fine equilibrium between the farming techniques and environment preservation.



Two mammals (*Sicista subtilis*; *Rhinolophus ferrumequinum)* and **6 amphibians and reptiles** (*Vipera ursinii rakosiensis* - priority species; *Bombina variegata*; *Triturus vulgaris ampelensis*; *Triturus cristatus*; *Bombina bombina*; *Emys orbicularis*) are also among the protected species listed in the Habitat Directive.

The High Nature Value of the area

6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

In the site area these habitats have been identified together with habitat 6510 along water courses with excess humidity, but also on the slopes of the valleys, especially those with north or north-east exhibition: Borşa, Dăbâca, Vultureni.

6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)

Local distribution Dăbâca, Borşa, Vultureni

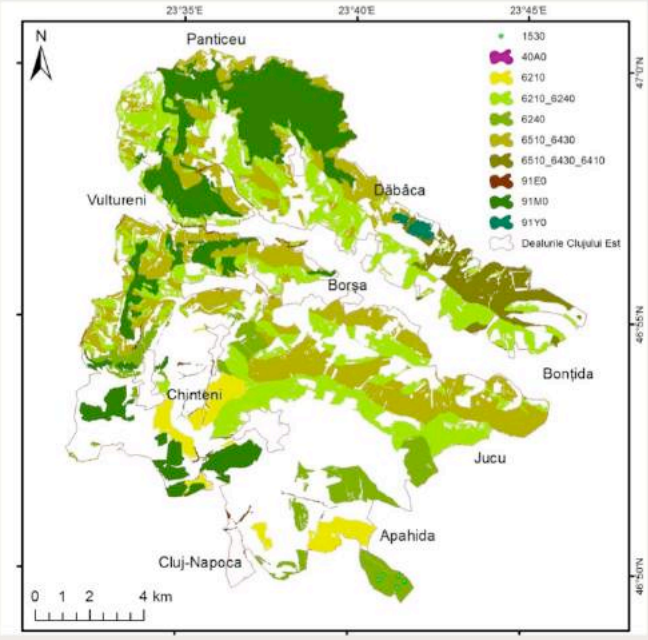
91E0 Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)

Approximatively 96ha
Their surface is quite small in the site. The habitat is dominated by *Salix species*. The most significant areas are found in the catchment area of the Ciepega and Borşa valleys: Borşa, Vultureni, Dabâca, Chinteni

91M0 Pannonian-Balkanic turkey oak –sessile oak forests

Approximatively 2778 ha
All forests in the western third site. Over 95% of the area occupied by forest ecosystems in the site, belong to this habitat type in Chinteni, Borşa, Vultureni, Dăbâca, Panticău

Map 12. Distribution of the HNV habitats identified in the LA



Source: Management Plan Natura 2000 site Dealurile Clujului Est

1530. Pannonic salt steppes and salt marshes

No typical habitat identified. Only some small islands with a series of specific elements.

40A0 Subcontinental peri-Pannonic scrub

About 0.7 ha in the site.
Site distribution: small islands, especially in Cluj-Napoca area.

6210 Semi-natural dry grasslands (Festuco-Brometalia)

About 972 ha in the site.
Can be seen as small islands on most sunny slopes: Apahida, Chinteni, Cluj-Napoca.

6240 Sub-Pannonic steppic

About 4000 ha in the site.
Sunny slopes: from Apahida, Chinteni, Cluj-Napoca.

6510 Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)

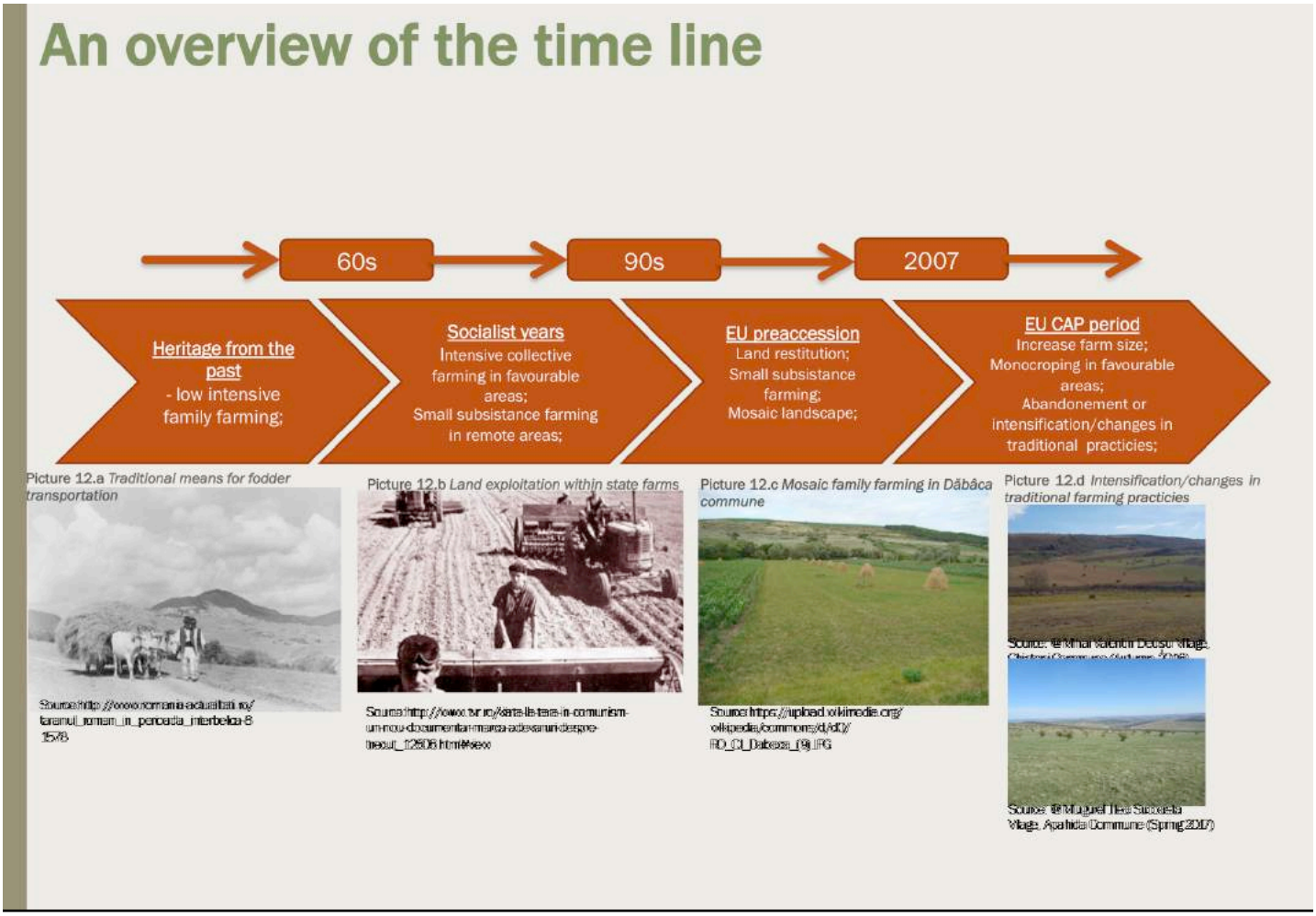
About 3955ha in the site.
Borşa, Vultureni, Dabâca, Panticeu, Bonţida.

91Y0 Dacian oak & hornbeam

About 68,5ha in the site.
Only Dabaca commune.

The time line

Explaining the present with the past



The human life in the learning area has been confirmed since the Neolithic period. In the 20thcentury, three main political changes shaped the socio-economic realities:

- the **Austro-Hungarian period** at the beginning of the 20th century (from the beginning of the century and until the Union with Romania on December 1st, 1918). The communes belonged to the Gheorghe Bánffy noble family, the former Transylvania's governor (Pintilie and Pintilie, 2001);
- the **interwar period** (1918 to the end of 1960's) when the nobleman land was given to farmers;
- the **socialist years** (end of 60's to 1989) when the most important parts of the land were expropriated by the state in order to create big state owned agricultural holdings;

To them, in the current century, other two politico-economic periods shaped the current status of the region. They are:

- the EU pre accession time (1989 to 2007) when Romania introduced several reforms based on integrum land restitution such as to adopt all the regulations needed for the EU accession;
- the EU Common Agriculture Policy (CAP) period (2007 – to present) when Romania applies all the CAP regulations.

Heritage from the past

The pre-modern legacy

The rural society : Villages, road, economy

Picture 13. Traditional household in Borsa Commune (1920)

Source: http://romaniainterbelica.memoria.ro/judete/cluj/

The family represented the basic social unit. The peasant family included, as a rule, the father, mother, children, grandparents and collaterals. All of them were preoccupied to produce food and clothing.

Map. 13. Road infrastructure in Cluj County in between two wars periods

Sourcehttps://ro.wikipedia.org/wiki/

Rural infrastructure: only basic roads along valleys; NO other types of infrastructure (electricity, water etc)
Relatively close to two national roads Cluj – Dej – Şomcuta, Cluj-Zalau and the railway Turda – Cluj – Huedin.

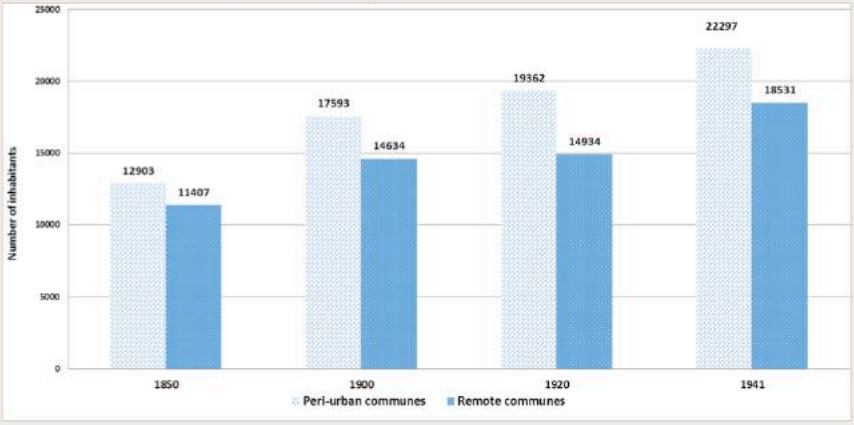
Economy: agriculture the main income source in the region;
Animal breeding the most important agricultural activity (cows; sheep and goat).

The region has a long history that can be traced from the Neolithic period (Pintilie, 2001 p 25). During the Roman Empire several Romanic settlements existed in the region (Loșonți et al. 2014 p. 78). Between the XIIth and the XIXth centuries the region was part of the Hungarian and then of the Austro-Hungarian Empire. In the 1st December 1918 Transylvania was united with Romania. In 1921 it was implemented a land reform that presumed: land nationalization from big nobility farms; family farms ownership with small land plots (max 4 ha per household). Thus, prior to 1945 the region became dominated by small scale farms that used extensive labour force (90% of the farms smaller than 3 ha; they used around 53% of UAA in Transylvania).

Village life gravitated around family farms subsistence agriculture, that was the main income source. Each household had some arable plots located immediately near the household. The family, usually composed of three generations (children, parents and grandparents), worked the land using extensive labour force to produce what was needed for the family subsistence. Out of the village there were some private plots (arable land, orchards, pastures, forests etc.) that were managed under individual or collective use.

Farming: men and women, farms, products and markets

Fig. 14. Evolution of the number of inhabitants (1850 – 1941)



Source: Romanian Institute of Statistics, 2017.

Tab. 2. Number of households in the region

Commune	1785	1850	1895	1930
Apahida	na	730	896	969
Bonțida	458	511	692	1123
Borșa	na	na	na	na
Chinteni	na	895	1146	1308
Dăbâca	186	358	442	na
Jucu	224	466	596	na
Panticeu	na	766	1051	1076
Vultureni	na	na	na	na

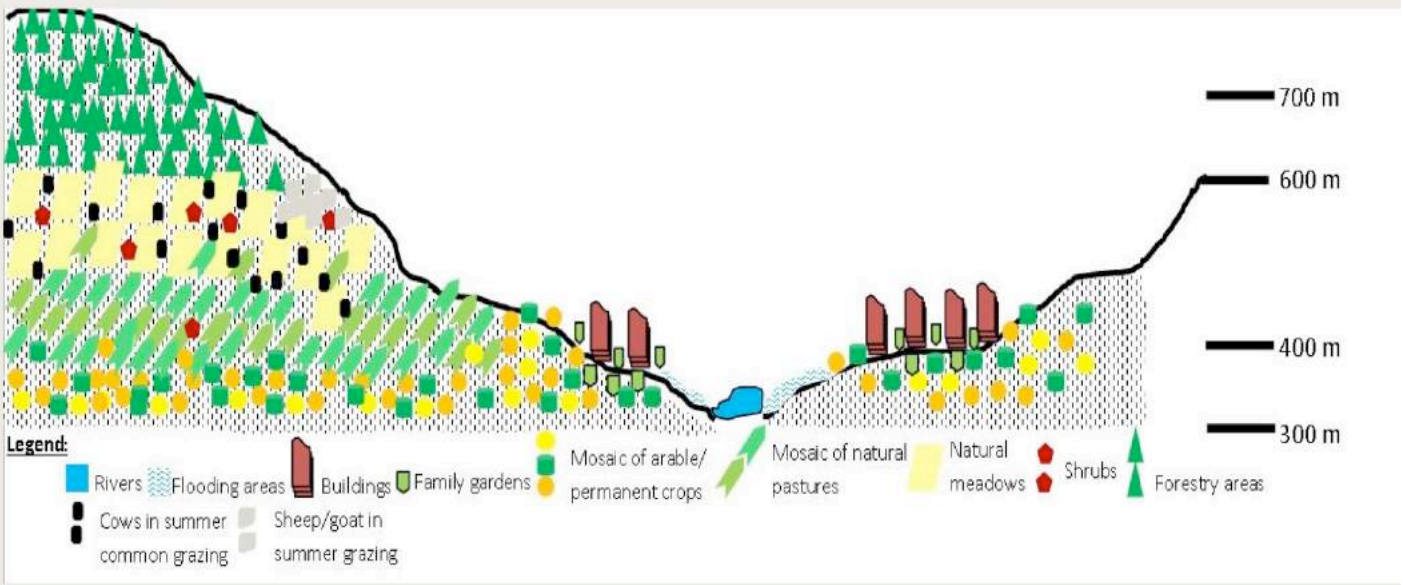
Subsistence farming; Average farm size below 3 Ha;
Traditional products sell on the local market in Cluj city;
Population and household numbers increase.

Generally, the household was created around two main areas: **the yard** (dwelling house, stables and other buildings); and the **garden** (field for cultivation of vegetables, bushes, orchards, vineyards etc). **The family** represented the basic social unit. The peasant family included, as a rule, the father, mother and children, and the grandparents together with collaterals. Roles were well delimited. The male was the physical, rational, supportive, and dynamic force of the family. The woman was linked to the function of mother, responsible for keeping the traditions and the natural flow of life in the family. The children constantly update their family responsibilities. They inherited along generations the traditions related to the organization of the house, courtyard and farming techniques (Loșonți et al., 2014).

Between 1850 and 1941, the number of population living in the area has constantly increased reaching in 1941 the level of 40,828 persons. It was a mixed ethnic group formed by Romanians (the vast majority), Hungarians and Rromas with different traditions, culture and religion.

They **applied subsistence family farming** (average farm below 3 ha) using low intensive techniques. The main share of the **crop products** was used for their **own consumption** (wheat, corn, potatoes etc). Some of the animal breeding products (fresh milk, meat, cheeses etc) and horticultural products (vegetables, tree growing etc) were **directly sold** on the Cluj-Napoca city markets. The urban area located near these villages helped them have an income source. The **agriculture was the main income source** but some inhabitants worked **in construction** to build local national infrastructure (roads; railways etc) or in industrial facilities located nearby (Cluj-Napoca and Gherla cities).

Fig. 15. Landscape transect prior to 1945 in Dealurile Clujului Est



In the middle of the XIXth century, the low land areas were constantly flooded by the rivers that had had high groundwater levels. In some areas there were some marshes areas formed on the clay bases soil. At the beginning of the XXth century the groundwater started to decrease and the land became the most fertile one used mainly for crop production. The farming techniques were specific for different altitude layers (Figure 15):

- **low level altitude** (between 290 and 400 m altitude) it was a mosaic of traditional small-scale arable farming developed on the land arable resources. **Small – scale farming** used **low-intensive traditional techniques** that yield mainly for subsistence purposes. Near the household each family usually had a family garden where it yielded all vegetables needed for family consumption;
- **medium level altitude** (400 to 600 m) was **mosaic of farming types**. The **arable land** from the lower parts (400 – 500 m) usually was used for crop production. Some of **natural pastures** areas were used for hay **fodder production** applying manual mowing. In the upper parts, there were usually situated the permanent natural meadows used for **summer grazing**. It was a form of common land exploitation. Animals collected from the village were grazed together on this land. Cows usually dominated over the number of sheep.
- around 1918 on the **high level altitude** (upper than 600 m) there was a mixture between permanent natural meadows and forestry areas. Prior to that, at the end of the XIXth century, that part was dominated by forest areas that were cut to build the Cluj-Napoca – Dej railway.

In conclusion, the region was characterised by a rich biodiversity explained by the small scale-agricultural production and low intensive techniques. Moreover, the hay-pastures were manually mowed in different annual time periods. Sometimes, the mowing period was established at the end of the year (mid-August and September) as a way to increase the average hay production. These techniques created special habitats for *Maculinea Sp.* butterflies and the vascular plants listed now in

The socialists years (1947-1989) correspond to the historic Romanian Communist Period when the country was known under the official names of the People's Republic of Romania, and the Socialist Republic of Romania (after 1980's) (Georgescu, 1992).

In agriculture, the Romanian Communist Party carried out during the 1949-1962 period the process of **land collectivization**, which consisted in confiscating almost all private agricultural properties and their management into state-run agricultural farms. The collectivization process was similar to that carried out in the USSR by including the agricultural land that could be gathered in a collective farm. This process ended in 1962. Many peasants were opposed to this action. They became witnesses of violent repressions, murders, deportations, imprisonment and confiscation of all the entire wealth.

In mountain areas and in some remote agricultural areas such as our learning area (especially in the high altitude level layers) there were many non-cooperative remaining plots (Kligman and Verdery, 2012).

Agricultural development in the period

Tab. 3. Number of state farms, total households and land ownership (1989)

		Apahida	Bonțida	Borșa	Chinteni	Dăbâca	Jucu	Panticeu	Vultureni	Total
I.	Number of socialist farms total									48
	1State farms	1	1	0	0	0	0	0	0	2
	2Farms from state agricultural enterprises	8	8	0	0	0	0	0	0	16
	3Mechanization farms	1	1	0	0	0	0	0	1	3
	4Agricultural cooperative units (CAP)	3	3	2	6	4	2	3	2	25
	5Other type	0	1	0	0	0	1	0	0	2
II.	Total households	2588	1623	846	1409	795	1484	945	936	2588
	Individual households	1138	387	0	0	14	119	53	71	1782

Source: Romanian Institute of Statistics, 2017.

Fig. 15.a Arable land ownership in 1989

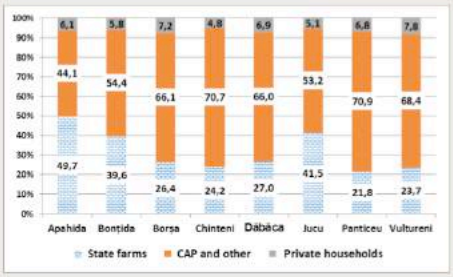


Fig. 15.b Meadows land ownership in 1989

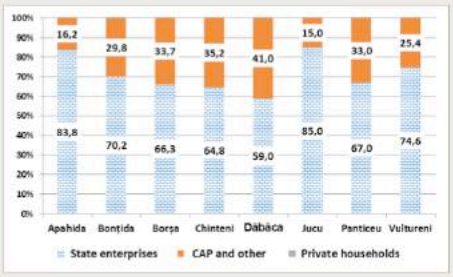
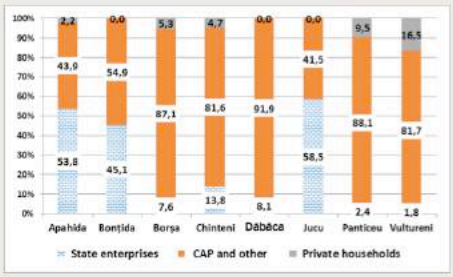


Fig. 15.c Pastures land ownership in 1989



Source: Romanian Institute of Statistics, 2017.

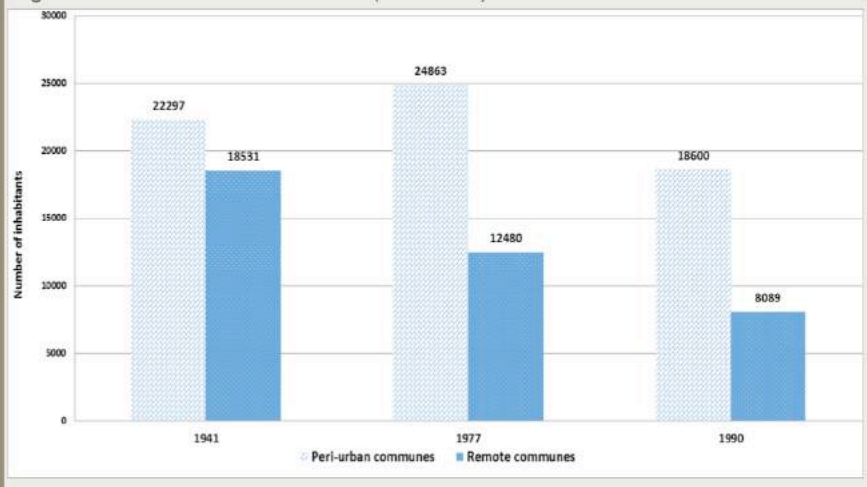
The area was affected by the **collectivization process**. In total there were 48 different socialist farms (Table 3). On one hand, the state farms developed for working the state owned land obtained after expropriation. On the other hand, the agricultural cooperative units worked the common property of all cooperative members. They represented the most important part of the former small size households that were forced to bring the land into such companies. Some of them could work their land individually, especially near households and in remote areas (arable and pastures) (Figure 15a, 15b, 15c).

The incentive for small subsistence agriculture was explained by **food storage** that existed in the cities areas. The most important food products (meat; milk etc) were missing as a consequence of the Government decision to pay the entire foreign debt using food exports (it worsened after the 70's). Because these households couldn't have had the political possibility to buy any kind of machineries, they still applied the traditional farming techniques (public property was not allowed).

In 1989 around 1700 individual households used approximatively 6% of arable resources. The shares of the private pastures from the total remain high in the remote communes and for high altitude layers. On that plots the individual farms used traditional farming techniques (manual mowing). That area is recognised today between **the most important HNV landscapes in the region**.

Changes in the rural and social context

Fig. 16. Evolution of the number of inhabitants (1941 – 1990)



Source: Romanian Institute of Statistics, 2017.

Picture 14. Image for state farms

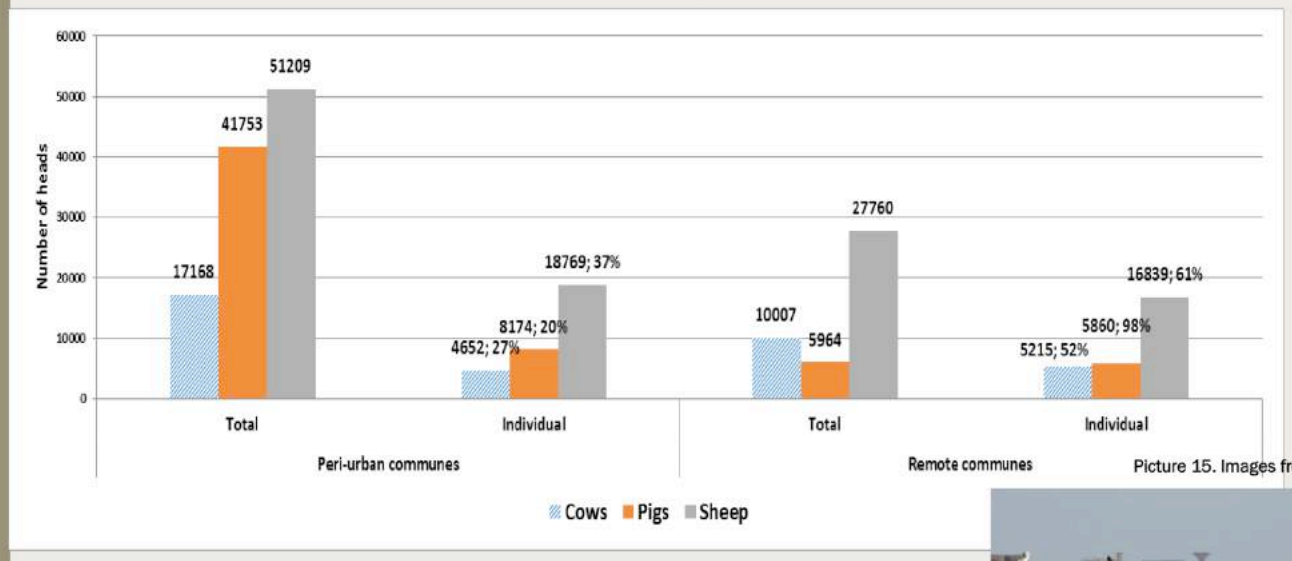
Source: http://www.gaben.ro/2010/10/14/cap-urile-democratiei//

- The village life was directly influenced by the political decisions: land collectivization; urbanization etc.
- The young generation moved into cities to work as employees in the state industrial companies;
- A dissolution of the traditional rural family;
- The number of inhabitants reduced especially in remote area communes (Borșa, Dăbâca, Panticeu and Vultureni);

In the socialist years the number of inhabitants decreased in all communes due to land collectivization and the policy of urbanization (Figure 16). The urbanization policy created a lot of industrial companies in the cities located in the proximity (Cluj-Napoca, Gherla and Dej). Especially the young generation moved there to work as employees. The traditional rural family was destroyed by these policies. The aged population and those that did not have the skills required in the urban area remained to work the land of the state farms (Picture 14).

Agricultural development in the period

Fig. 17 Animal breeding acording to ownership structure (in 1989) (for Bonțida x10 heads for pigs)



Source: Romanian Institute of Statistics, 2017.

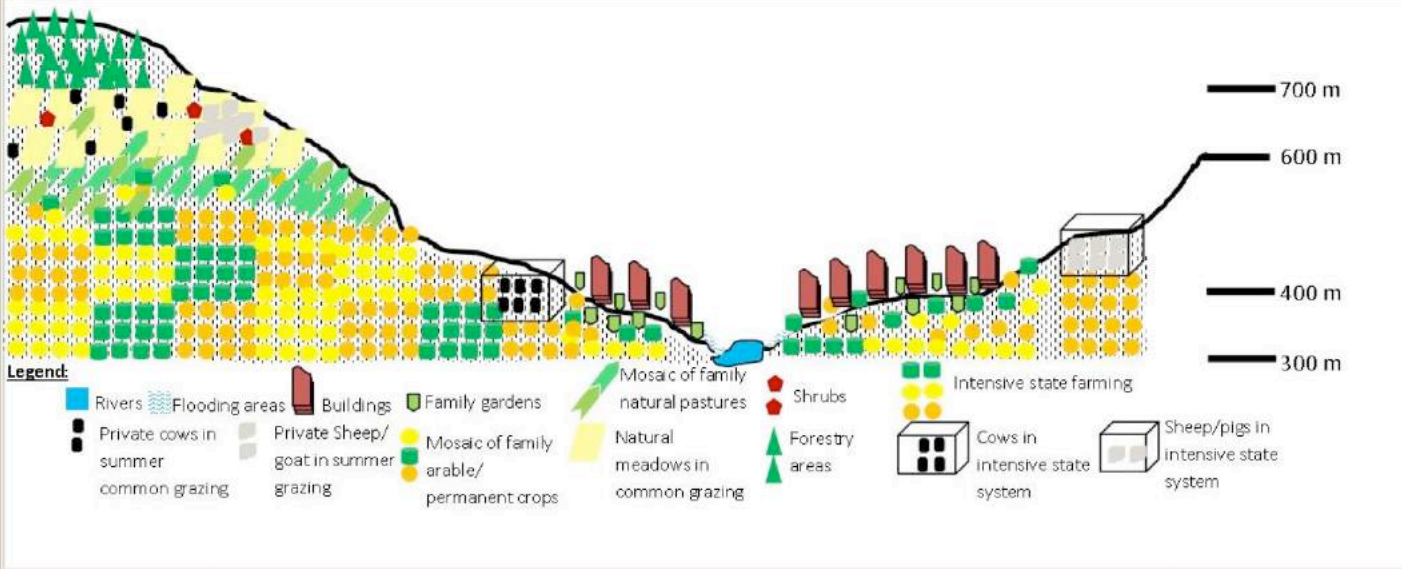
Picture 15. Images from state farms

http://agroromania.manager.ro/tags/cooperativa%20agricola%20de%20productie/

The number of livestock increased a lot during the socialist years. In Bonțida and Jucu there were two state farms specialized in pig breeding with around 180,000 heads in 1989 (Figure 17). There was a relatively balanced situation between the number of the sheep and cows in the region. The individual holders kept important number of animals in private property. The summer grazing was still accepted in several commune grazing meadow areas. The winter forages for the individual holders were produced mainly by manual mowing on the permanent pastures areas. The farming technologies from the state farms intensified based on the inputs produced on a large scale by the domestic market (Picture 15).

Consequences of land use and biodiversity

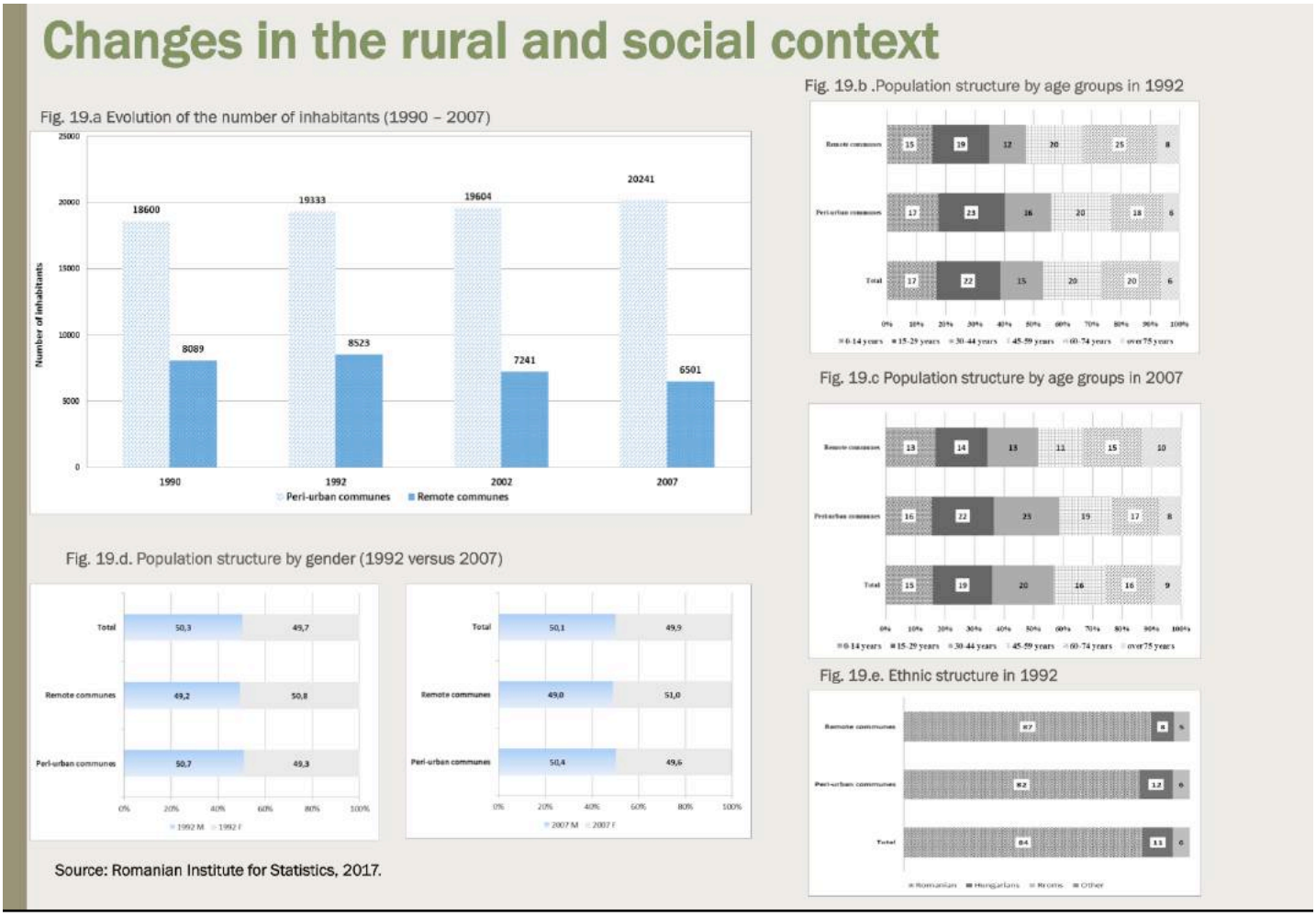
Fig. 18. Landscape transect in the socialist years (1960 – 1989)



The farming situation was different according to the land ownership and altitude layers:
- 300– 500 m: arable land mainly exploited in intensive state farms; several big state facilities (stabling houses; warehouses etc) were built in the area to keep an increasing livestock number; some small plots of arable land and family gardens still exploited using low intensive techniques near the households;
- 500– 700 m: forestry areas slowly started to increase in their size; permanent pastures still farmed by applying traditional techniques; permanent meadows sometimes overgrazed;
The **key HNV habitats** survived in remote agricultural areas (high altitude layers) and where low intensive farming techniques were applied, mainly by individual farmers (around 10% of the territory).

Period 2. The EU pre accession time

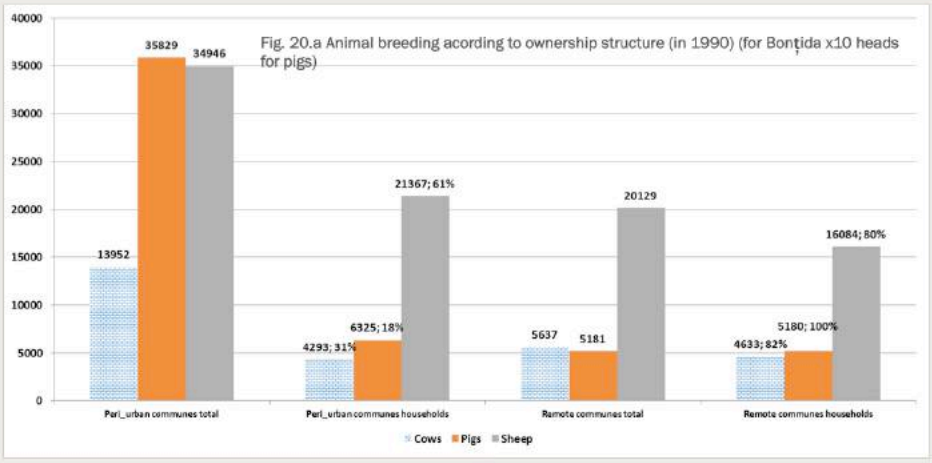
1989 to 2007



After 1989, Romania has encountered an important political shift from a centralized state economy to one dominated by the market forces. This process allowed starting the negotiations process with the EU for the Romanian accession. The formal EU accession was achieved at the beginning of 2007. It was a challenging period in which almost all state companies activating in the industry collapsed and finally got bankrupted. That explains the increasing number for the population living in the study area from 1990 to 1992. Between 1992 and 2007 the number of inhabitants increased in the peri-urban communes that started to have a residential function for the persons working in Cluj-Napoca. The number of inhabitants strongly decreased in the remote area communes (Figure 19.a).

The population remained relatively balanced in terms of gender structure, **although the female population share started to increase** (Figure 19.d) due to higher gender expectation life. The population became more aged during the same period due to low birth rate (Figure 19b and c). The shares of the population with an age more than 75 years reached 15% or 14% in Dabaca and Vultureni. There are the communes that have the most important HNV areas.

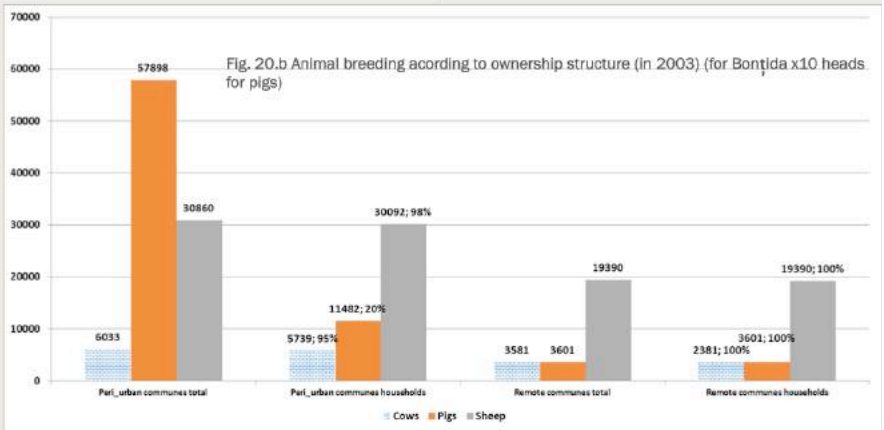
Agricultural development in the period



Source: Romanian Institute for Statistics, 2017.

Picture 16. Collapsed state farms

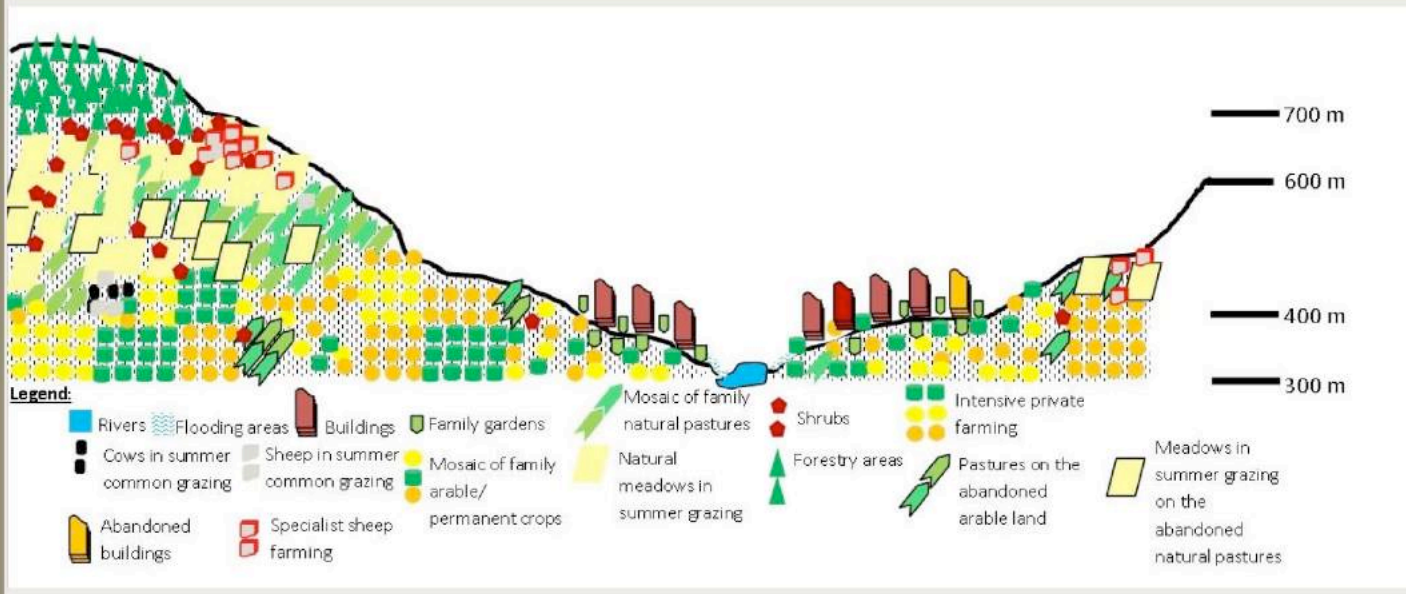
http://http://www.cvlpress.ro



The **livestock structure changed** between 1990 and 2003. The **private households sector started to dominate the number of livestock** (Figure 20 a and b). Also, it can be noticed that **the absolute number of all types of livestock sharply decreased** in comparison with the 1990's data. This phenomenon was extremely intense for cows and pigs breeding (because they required forages that could not be provide after land restitution by the state farms) and less important for sheep sector that started to dominate the area. The state farms collapsed because there were several land reforming measures that presumed to give back the land to the former owners (Picture 16). After that process, there were created around 4.2 million individual farms with an average of 2.8 Ha in Romania (mostly subsistence and semi – subsistence ones).

Consequences on land use and biodiversity

Fig. 21. Landscape transect in the EU preaccesion period (1989 – 2007)



In the 1989 - 2007 period :

- 300– 500 m: arable land mainly exploited in subsistence and semi-subsistence family households recovering their land; on the most fertile areas emerged the first private farms organized as enterprises and not based on family labour; some arable land areas were not farmed anymore and became pastures;
- 500– 700 m : forestry areas slowly started to increase in their size; permanent pastures were farmed by applying traditional techniques; permanent meadows remained under grazed at the beginning of the period; Shrubs number increased on the permanent meadows and pastures;

The key HNV habitats increased a lot in the early years (1989 -2000) due to low intensive techniques.

Period 3. The EU Common Agriculture Policy (CAP) period

2007 to present

The Common Agriculture Policy and the agri-environment payments

Tab. 4. Financial support received in the first CAP pillar (2007 – 2014)

Description of payment	U.M.	2007	2008	2009	2010	2011	2012	2013
SAPS	Eur/ha	50.55	60.75	71.12	80.36	101.88	122.26	142.64
National complementary payments (decoupled crop)	Eur/ha	47.00	46.71	44.64	50.64	50.64	50.64	50.64
Payments for energy crops	Eur/ha	45.00	45.00	45.00	45.00	45.00	45.00	45.00
Separate sugar payment scheme	Eur/ha	77.20	111.24	165.89	189.62	189.62	189.62	189.62
Complementary National Payments Cattle	lei/head	490	495	571	410	410	410	410
Complementary National Payments sheep and goats	lei/head	35	43.9	44	40	40	40	40

Source: selective Romanian legislative framework;

Tab. 5. Financial support received in the agri-environment measures (2007 – 2014)

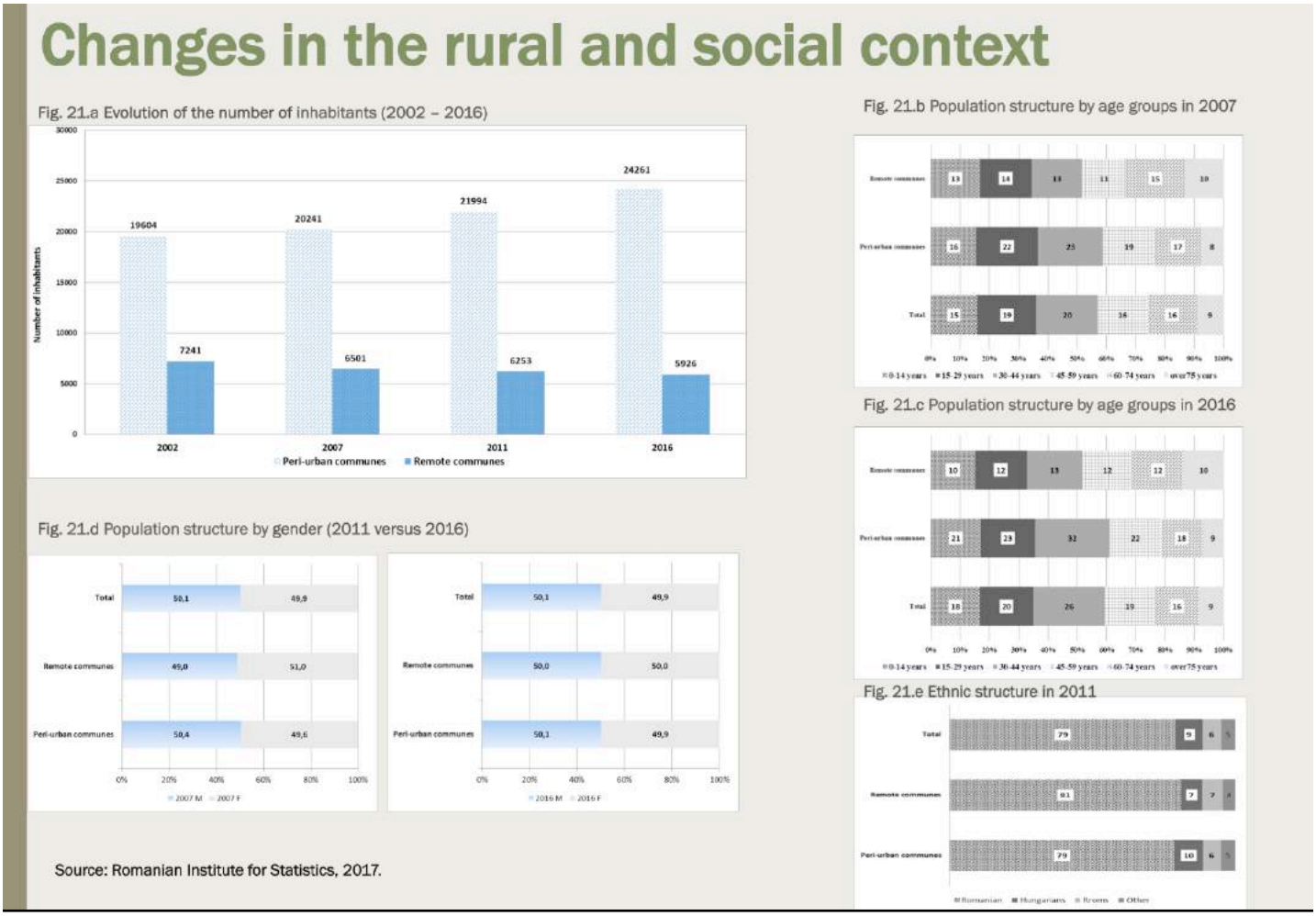
Description of payment	U.M.	5 year period
HNV meadows	Eur/ha	124
Traditional practicies	Eur/ha	58
HNV important for birds conservation	Eur/ha	209
Green productions	Eur/ha	130

Source: selective Romanian legislative framework;

According to the legislative framework, Romania adopted in the first three years after accession a **simplified direct payment system** – SAPS, that was extended until the end of 2014. In **the crop sector**, the amount of financial support was established per eligible hectare and it was a flat payment calculated annually by dividing the national financial envelope to the eligible area in use. To be entitled to SAPS, a farm had to meet several eligible criteria (Governmental Ordinance 125 /2006): apply specific crop (arable land, permanent grassland, permanent crops and households gardens; the minimum size of the farm was set to at least one hectare and the minimum plot size had to be at least 0.3 hectares). To the SAPS payment a farmers could also add national complementary payments conditioned by the crop type (Agricultural Ministry Decision 704/2007): **complementary national direct payments** calculated as a fixed amount per hectare for cereals, protein crops, industrial crops, root crops, potatoes, vegetables etc; **complementary national direct payments** for crop, hemp, tobacco and hops sector; **complementary national payments** for sugar beet and a separate payment for sugar. **The complementary direct** payments in the livestock sector were calculated annually per livestock head according to several eligible criteria (minimum animal numbers e.g. at least 3 mother cows and 25 sheep).

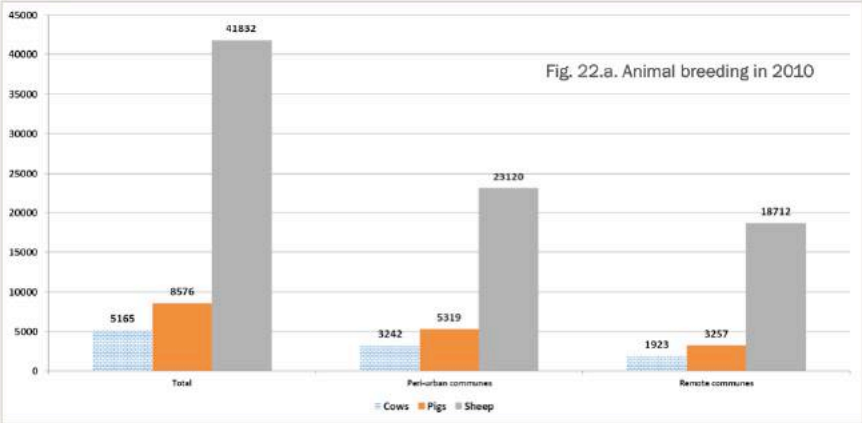
Also there were implemented four agri-environment measures for specific designed eligible areas (Table 5).

The minimum eligible size criteria penalised from the start the small households (smaller than 1 ha) that started to disappear. In the same time, high areas of arable land but also common pastures were used by the newcomers that applied new farming techniques.

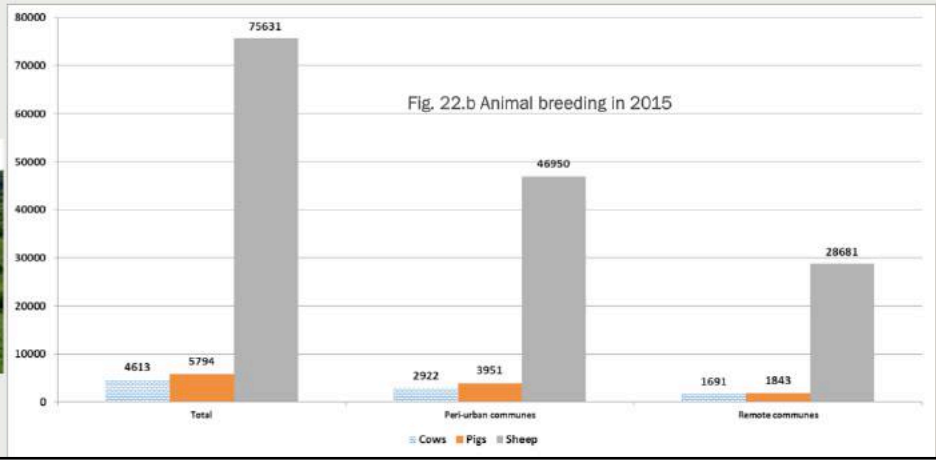


In four communes out of eight (Borșa -34 km, Dăbâca-39 km, Vultureni- 31 km, Panticeu- 53 km) located relatively far from Cluj-Napoca city there was an important **decreasing trend for the number of total inhabitants**. In the other four communes the inhabitants number increase is explained by **the dormitory function** of the communes for the active population that works in Cluj-Napoca (Apahida – 10 km, Chinteni – 10 km), as well as their **positioning near the industrial parks** and the National Road DN1 (Jucu – 20 km, Bonțida – 30km) (Figure 21.a).
The population remained relatively balanced in terms of gender structure, **although the female population share became the most important one** (Figure 21d). The population became more aged during the same period especially for the remote HNV areas (Figure 21.b and c) and the number of Hungarian speaking population decreased together with the increase of the Rroma population share (Figure 21.e).

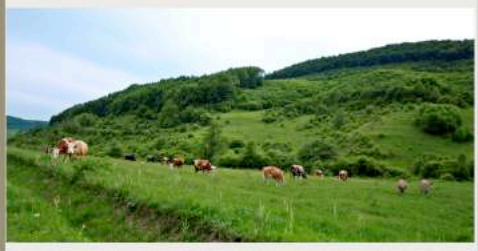
Agricultural development in the period



Source: Romanian Institute for Statistics, 2017.



Picture 17. Household livestock grazing the common land

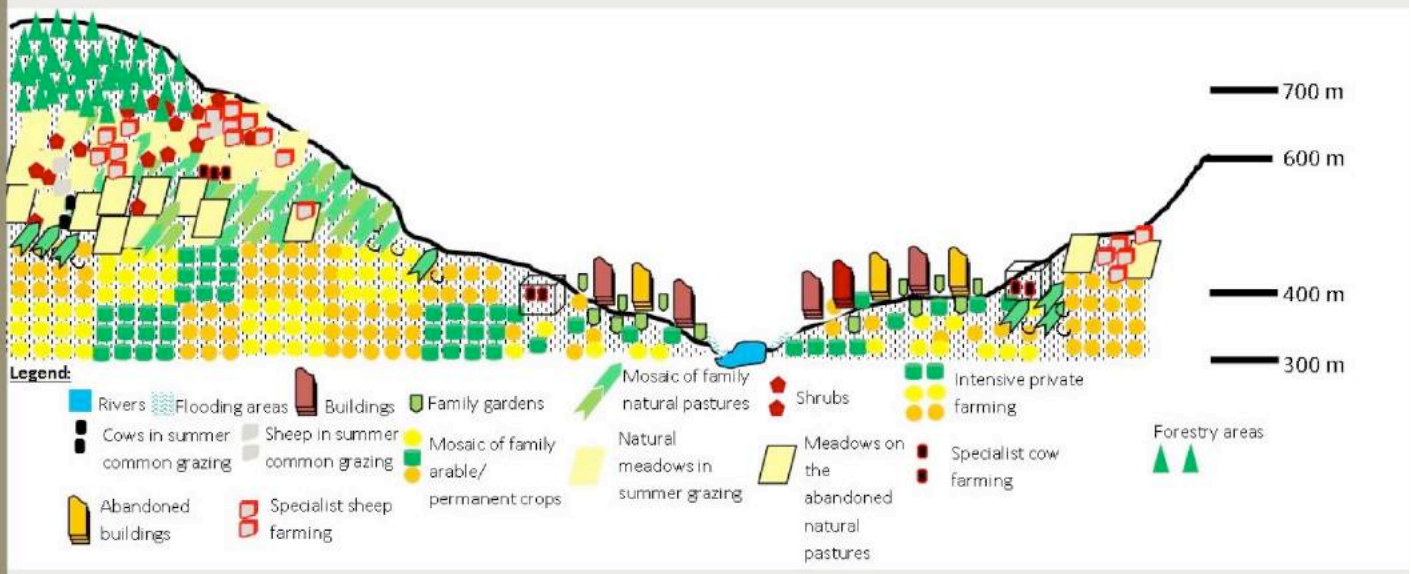


Commong grazing in Dăcâca commune @ May 2017.

The number of sheep almost **doubled** in some communes between 2010 and 2015 (Figure 22.a and b). They reached levels compared with the 1989 data. In the same period, the farmers changed the breeding techniques: the local mixed breeds were crossed with imported meat breeds; the main products changed from milk/cheese into lamb meat exported to the Middle East countries; the flock was kept in free stabling all year long. All these farming changes started to alter the natural value of several permanent meadows. Also, some natural pastures were abandoned due to the high labour demands. A lot of young people emigrated to EU countries to search better income sources. In several areas, the land was grabbed by persons coming from outside the commune and the **common grazing became an exception** (e.g. in Pâglișa village the flock number from the households severely decreased to only 15 cows in 2017 comparing to 50 heads in 2010) (Picture 17).

Consequences on land use and biodiversity

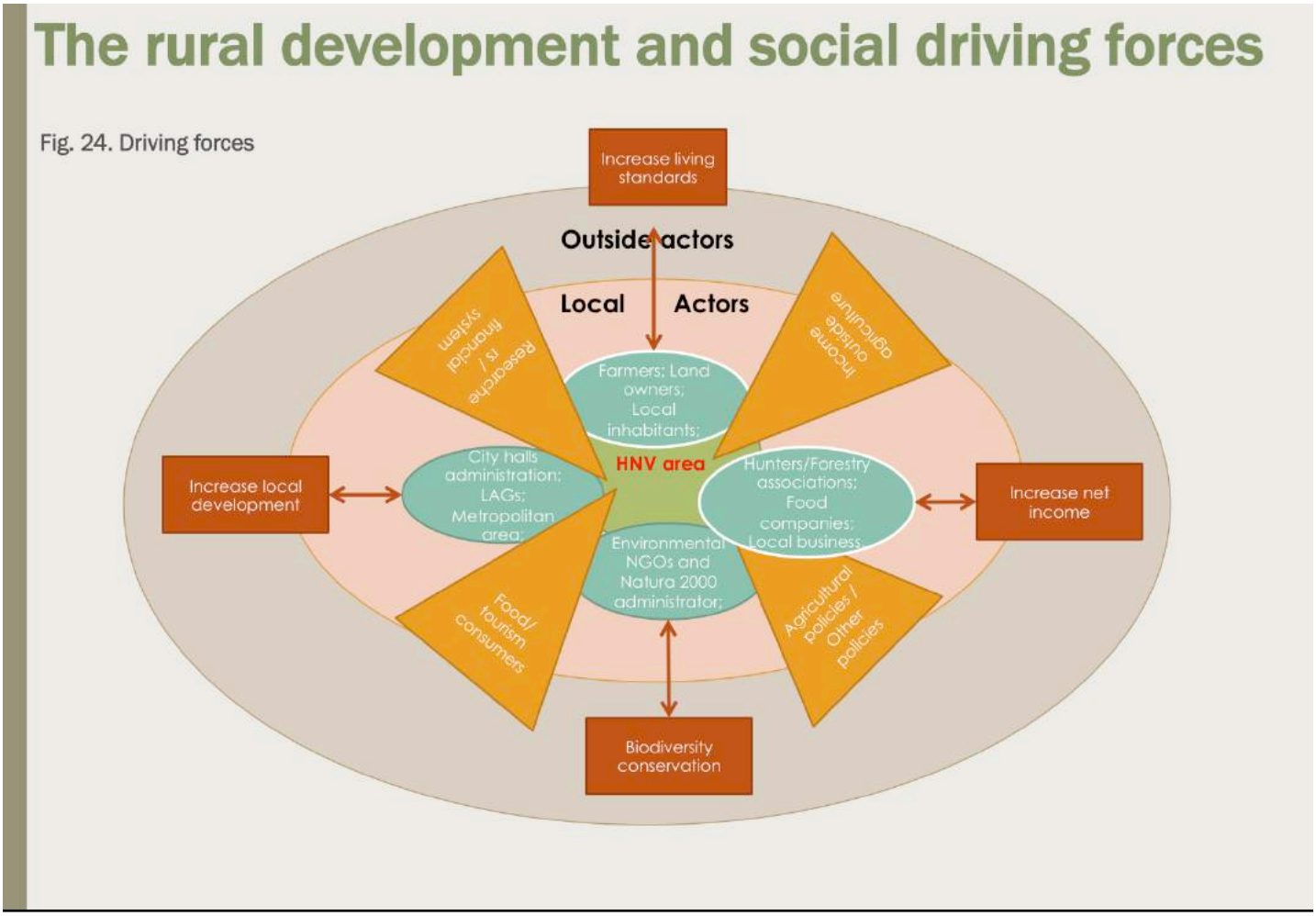
Fig. 23. Landscape transect in the EU CAP period (2007 – to present)



In the period 2007 - present:
- 300– 500 m: arable land mainly exploited in private farms organized as enterprises and not based on family labour; some arable lands still farmed in small family plots near the villages;
- 500– 700 m : forestry areas increased in terms of size; the area corresponding to the **permanent pastures manually mowed sharply decreased**; permanent meadows and some parts of the pasture areas started to be used by specialized sheep farms;
The key **HNV habitats areas decreased**. The acreage is still higher than 1989 data. The common EU market and common labour force **almost destroyed the household traditional farming practices**.

The business as usual scenario

Where do we go in 2030 in the current situation?



The management of the HNV area is influenced by different actors (Figure 24). The local actors have different interests and expectations from the HNV area.

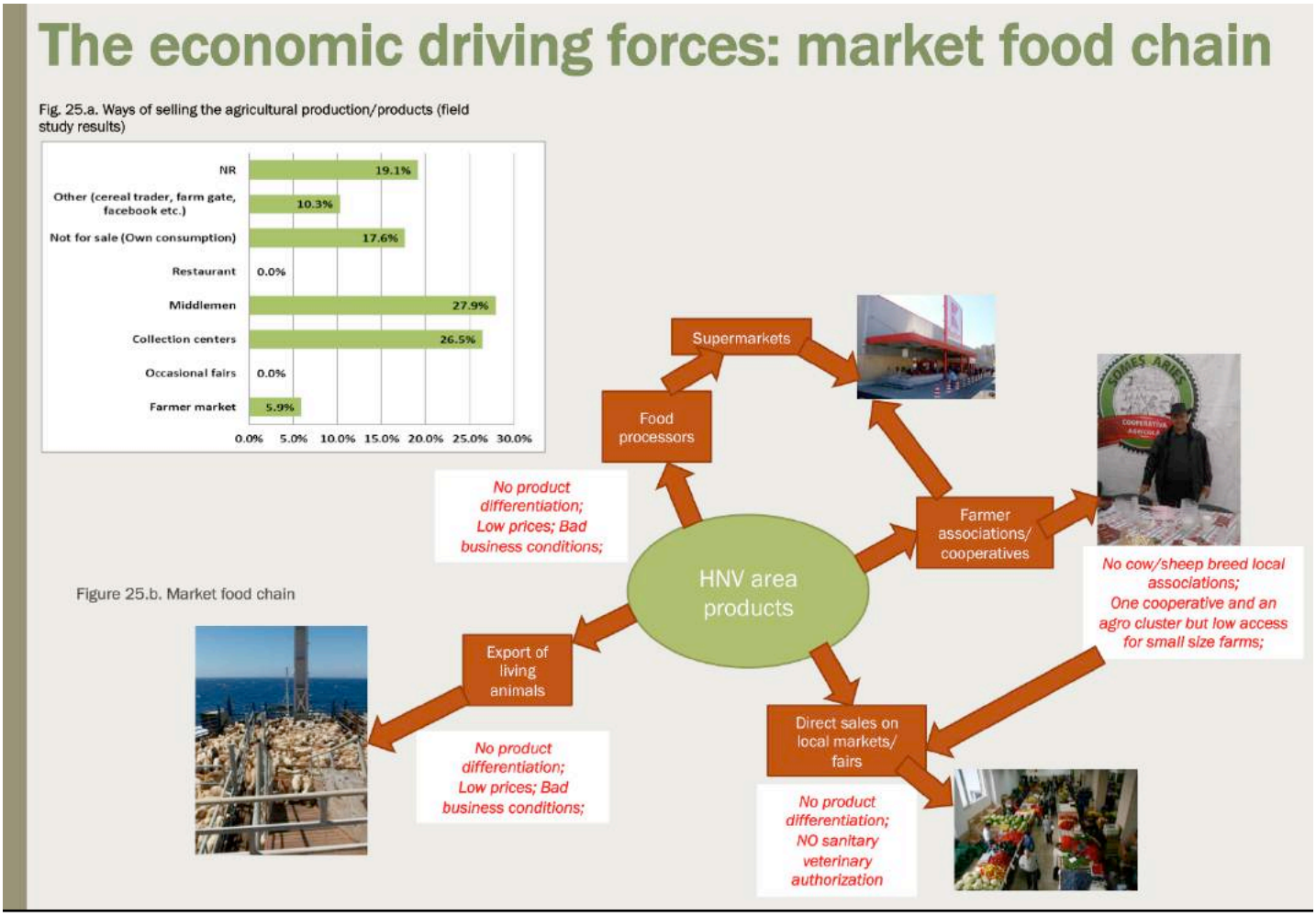
The farmers that used the land, but also the **local inhabitants** and land owners want to obtain higher incomes. In an open European market, it is hard for the young generation to wait for an economical development in the areas until they will obtain comparable revenues to those from the other EU member states. This is the reason why, in the last years, they emigrated in large numbers to urban areas or other EU countries.

Environmental NGOs and the Natura 2000 site administrator (Lepidopera Association) mainly want to protect the vulnerable habitats. They created a management plan for the Natura 2000 site that has to be followed up by the local inhabitants. The outcomes are conditioned by the acceptance and understanding degree obtained in different population and farmer types.

The local administrative units (city halls; city's councils; county's councils) created different development strategies. Some of them recognized the HNV area as an asset that deserves to be better valorised. There are opposite views across these actors about how to use the HNV resources – promoting only tourism or a mix between the development of local products and agri-tourism.

The outside actors that influence the HNV areas are:

- Food/ tourism consumers. In the last years, the share of domestic consumers of high qualitative local food increased. Also more and more Romanians are visiting the agro-touristic facilities. The trend is an opportunity that can be valorised by the small households that still apply traditional techniques;
- Agricultural policies/ other policies. Romania applies the Common Agriculture Policy measures. In the second pillar there are different measures that can help to invest in rural areas. The HNV farming has different agri-environment packages. The farmers lack real information about these measures and the administrative burden is considered to be too big for them;



The marketing chain is different accordingly to the farm type. **The local households** use mainly their own inputs (seeds; manure; forages etc) and sell only low output quantities. The main products sold on the market are those obtained from small scale animal breeding (milk; cheese; and living animals). They mostly use the direct-selling channels (in our-door farmer markets) and milk collection centers. The latter refer to cooler cars own by local milk processors that periodically (once or twice a week) collect the milk from the entire commune. Only a small part of the households have refrigerator facilities to store the milk between the collecting days.

The commercial farms (predominant for the crop sector; specialized animal breeding farms – 60 to 80% from the land) buy inputs (seeds, fertilizer etc) from suppliers within the county or other regions or use their own inputs (e.g. seeds; forages). Depending on the scale of production, the farmer decides how to capitalize the production. Besides the own consumption (field study: 17.6%), four more paths were identified (Figure 25.a): (1) direct sales on local markets/fairs (field study: 5.9%, in-door farmer markets every day in big cities, out-door farmer markets from May to October in Cluj-Napoca only for small producers), (2) farmer association/cooperatives (field study: 1.47%, e.g. Cooperative "Somes Aries"), (3) export of living animals, (4) food processors and supermarkets (field study: 27.9%).

There are a **small number of food processing companies** developed in the area due to lack of capital and heavy administrative burden (sanitary-veterinary regulations). Also, there is **no authorized slaughterhouse** in the region. Farms mainly sell raw materials and no high value added products.

The policies and political driving forces

Map 14. Agri –environment packages in Romania and in LA (2014-2020).

Not the entire territory covered by the agri-environment packages
Borșa, Dăbâca, Bonțida, Panticeu: P6
Vultureni: P1+P2;
Chinteni, Apahida, Jucu No HNV package!!

Tab.6. Agri-environment measures in the second CAP pillar (2014 -2020)

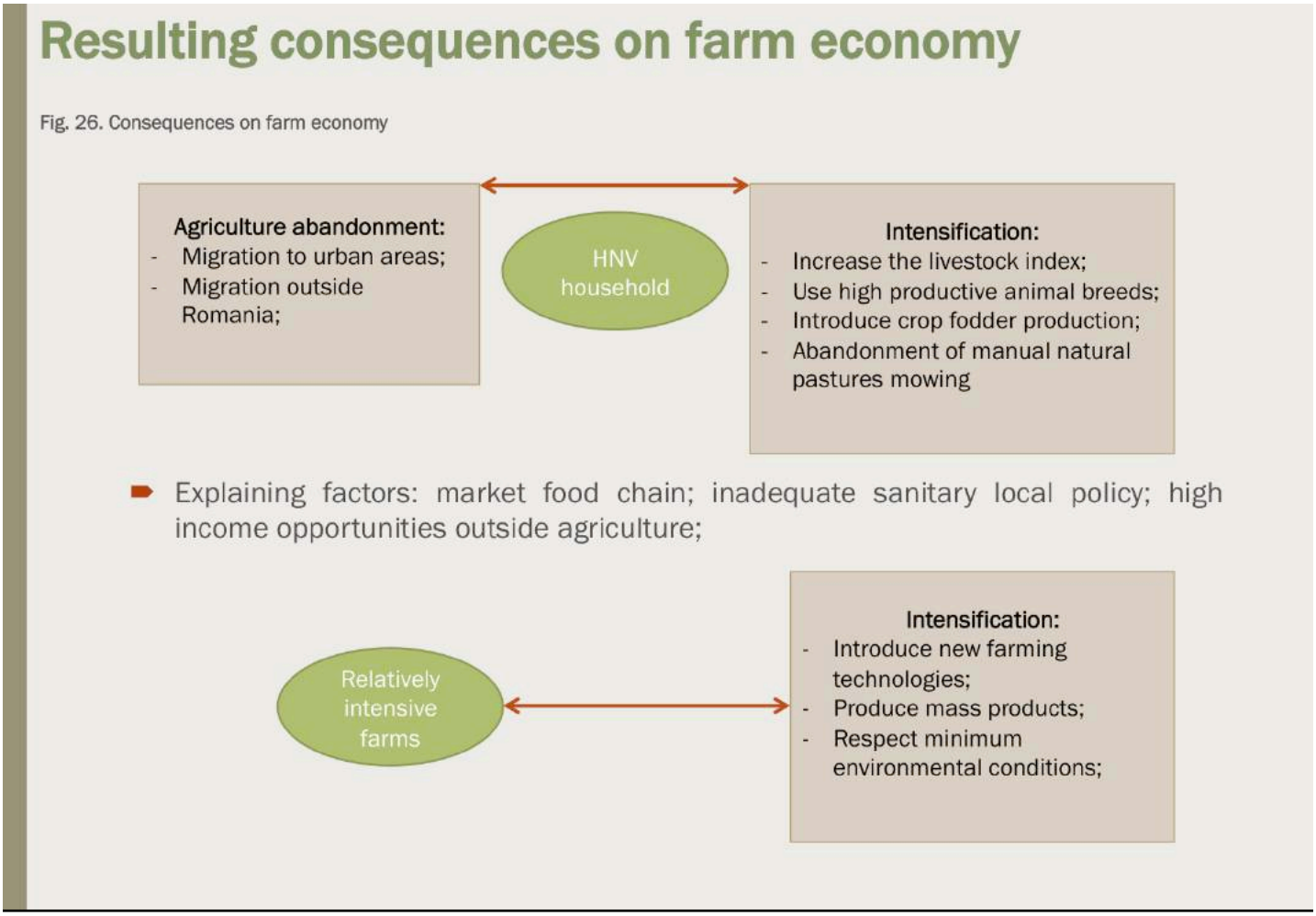
Agri – environment package	Payment
M10 -P 1 – HNV meadows	93 €/ha/year
M10-P. 2 – Traditional farming (in combination with P.1)	-
M10-P. 2.1 – manual works	100 €/ha/year
M10-P. 2.2 – work with light machinery	21 €/ha/year
M10-P. 3 – meadows important for birds	-
M10-P. 3.1 – Crex crex	-
M10-P. 3.1.1 – manual works	261 €/ha/year
M10-P. 3.1.2 – work with light machinery	182 €/ha/year
M10-P. 3.2 – Lanius minor and falco vespertinus	-
M10-P. 3.2.1 – manual works	159 €/ha/year
M10-P. 3.2.2 – work with light machinery	80 €/ha/year
M10-P. 4 – green crops	128 €/ha/year
M10-P. 5 – adaptation to the effects of climate change	125 €/ha/year
M10-P. 6 – meadows important for butterflies(Maculinea sp.)	-
M10-P. 6.1 – manual works	361 €/ha/year
M10-P. 6.2 - work with light machinery	282 €/ha/year
M10-P. 7 – Branta ruficollis	250 €/ha/year
M10-P. 8– local breeds protection	-
Sheep	87 €/UVM/year
Goat	40 €/UVM/year
Bovines	200 €/UVM/year

Not clear information to farmers;
Refusal to apply for agri-environment measures due to control burden;
Land grabbing by specialized farms;

Source: Romanian Rural Development Program 2014 2020.

The agri-environment payments distribution shows **high inconsistences** between communes. Some of them are eligible for an **agri-environment package** designed to support the **conservation of *Maculinea* butterflies** (P6 in Borșa, Bonțida, Dăbâca and Panticeu). One commune is eligible only for HNV meadows packages (Vultureni) and the other only for green crops and ecological agriculture payments (Chinteni, Jucu, Apahida) (Map 14). The differences that exist in the agri-environment obligations (mowing allowed in package 6 only after mid-august; maximum breeding index per hectare) and the payment level can distort farming practices at the local level.

Due to existing inconsistency for the designation of the packages eligible area in comparison with the Natura 2000 site area and also due to the lack of information for farmers (proved in the field study) some of them became **reluctant to apply for such payments**. They are more attentive to the direct payments allocated per animal heads. The later type of payment (around 10 euro/ year/mother sheep) sustained the flock number increase that was observed in the last years for the commercial farms. For the **households**, the agri-environment packages, are **hard to be accessed** due to the existing **mandatory thresholds** (one hectare minimum farm size; 0.3 ha minimum plot size) and **bureaucratic burdens,** although such payments can substantially increase the annual net income. A Natura 2000 payment is not yet established for Romania though such subsidies can sustain the application of the local management plans for such sites.

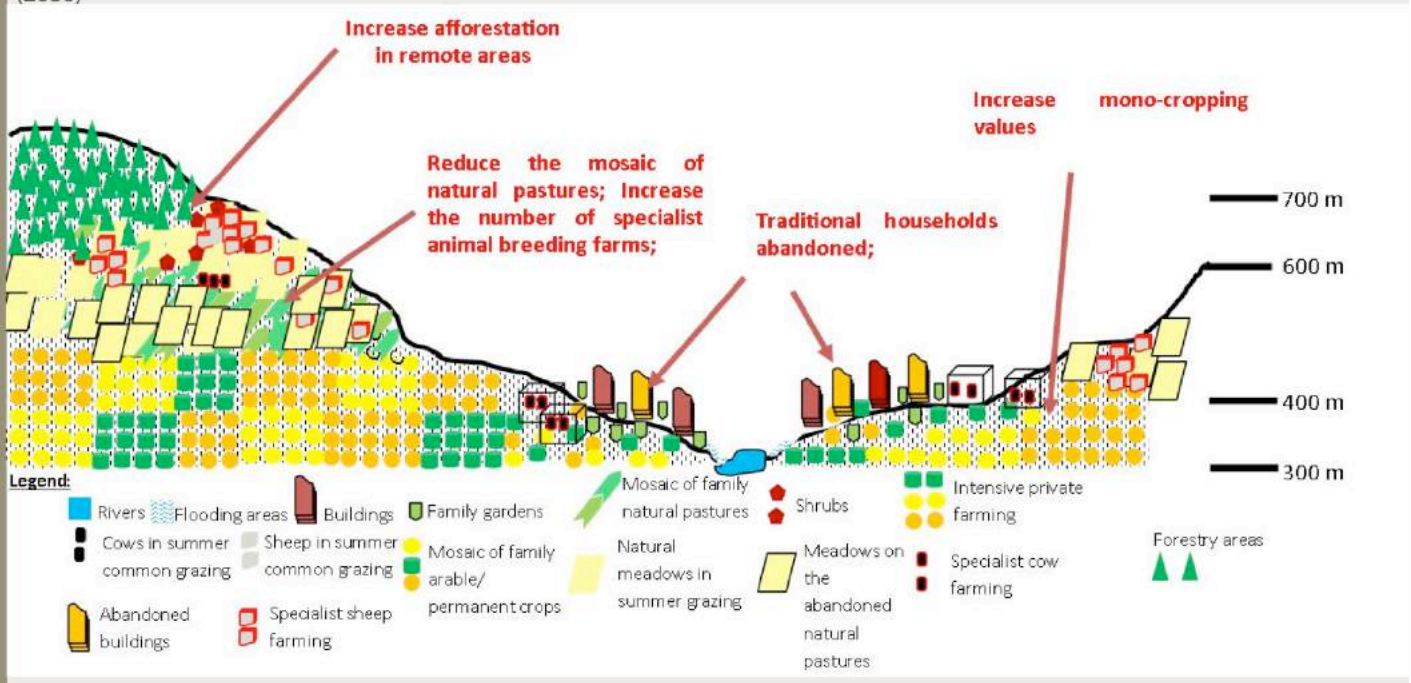


Based on the above mentioned driving forces, a **HNV household** is now in between two extreme decisions: one is to abandon land and to obtain incomes from other activities; or to intensify production such as to survive on the EU common market.

The **relatively highly intensive farms** (specialized in sheep and cow breeding and in crop production) are now undergoing an intensification process. Without offering alternative markets for high value added products the intensification process will intensify.

Resulting consequences on land-use and biodiversity

Fig. 27. Transect in the business as usual scenario (2030)



- 300– 500 m: consolidation of the intensification process; mono-cropping will dominate the landscape (wheat; rape seed; corn);
- 500– 700 m: increase of afforestation in the remote agricultural areas; Mosaic of natural pastures manually mowed only as exceptions in some protected areas. Meadows will increase in shares and they will be used especially for sheep summer grazing; the number of household flocks will decrease; increase the number of specialized animal breeding farms;

The **key HNV habitats will** survive only in some key protected areas.

The HNV vision

Managing biodiversity landscapes for a vivid society

Field study - questionnaire

Tab.7. Age of respondents

Age	No. resp	Mean	St.dev.	Min	Max
Peri-urban communes	32	41.74	11.95	24	62
Remote communes	84	43.08	15.32	18	78
Other	7	37.00	8.28	27	47
All communes	123	42.54	14.21	18	78

Overall:

- 75.8 % have knowledge about HNV farming concept;
- 68.2 % are aware of HNV farming in the communes;

In-person survey ➔ 132 respondents (68 farmers + household members)

Fig. 28.a. Knowledge of HNV concept among respondents by communes

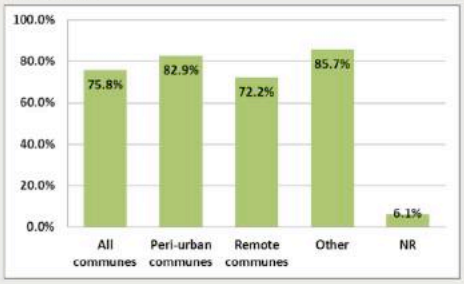
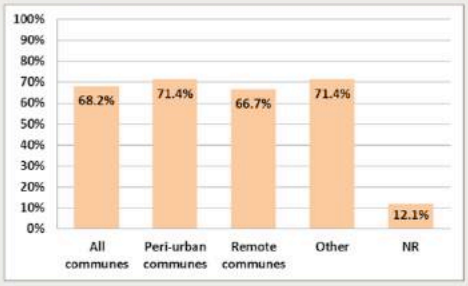


Fig. 28.b. Aware of HNV areas in communes among respondents by communes



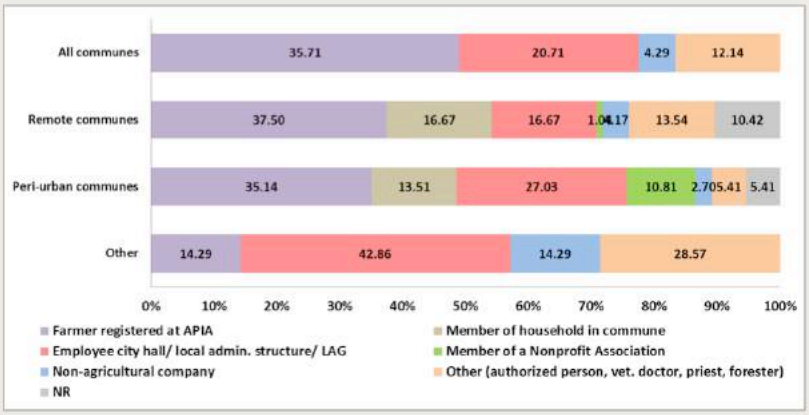


Fig. 28.c. Administrative category

A field study was conducted between January and May 2017 to better understand the level of knowledge and perception of HNV farming on 132 respondents. Even if the respondents are between 18 and 78 years old, a significant number (42.42%) is older than 42 years (Table 7). Respondents belong to different administrative categories (some respondents chose more than one category).

Overall, 75.8 % have knowledge about HNV farming with lower percentage in the remote communes that have the most important land shares in the Natura 2000 site (Fig 28.a). Even if overall, 68.2 % are aware of HNV farming in the communes, the distribution over the communes is different: the stakeholders from the peri-urban communes seem to be better aware (Fig 28.b).

Involvement of stakeholders is important in the area, especially of the employees of city hall/ LAG which help farmers to apply for financial support from NRDP. It also shows the interests of each category in this particular subject and willingness to work together as a community (Fig 28.c). Other communes outside the LA are: Bobâlna, Aluniș, Cluj Napoca, Căianu and Sic.

Field study - questionnaire

Overall:
- 46.7 % HNV farming is weak capitalized;
- 43.3% Large surfaces will use new technologies that require mechanical mowing, a large no. of animals per hectare etc.
- 16.67% Large surfaces will be abandoned;
- 25.56% Pastures & grasslands used in same conditions;
- Main issues to be solved: better farmer association (38.9%), better environmental friendly techniques (28.9%), better marketing (21%);

Fig. 29.a. Perception about HMV farming in 20 years

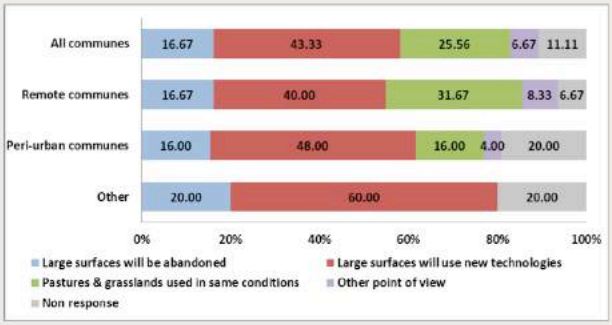


Fig. 29.c Level of appreciation regarding the current situation of HNV farming by communes

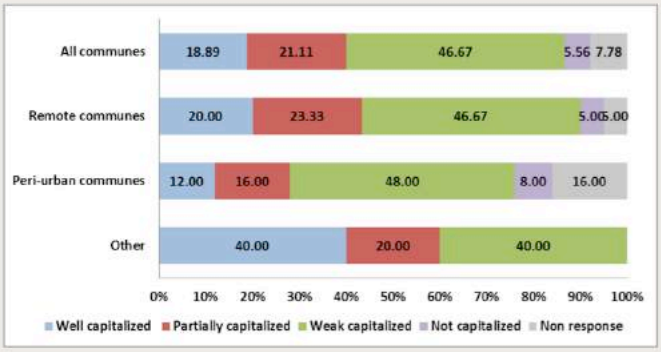
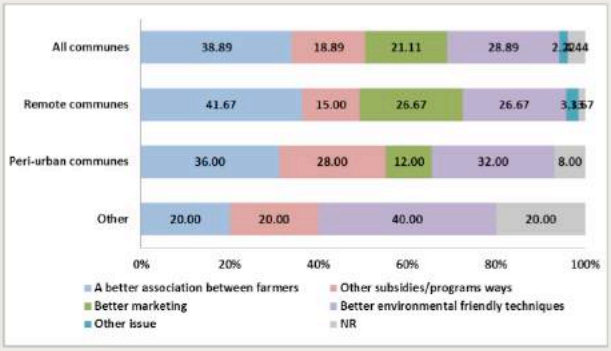


Fig. 29.b. Issues to be solved to maintain HNV farming

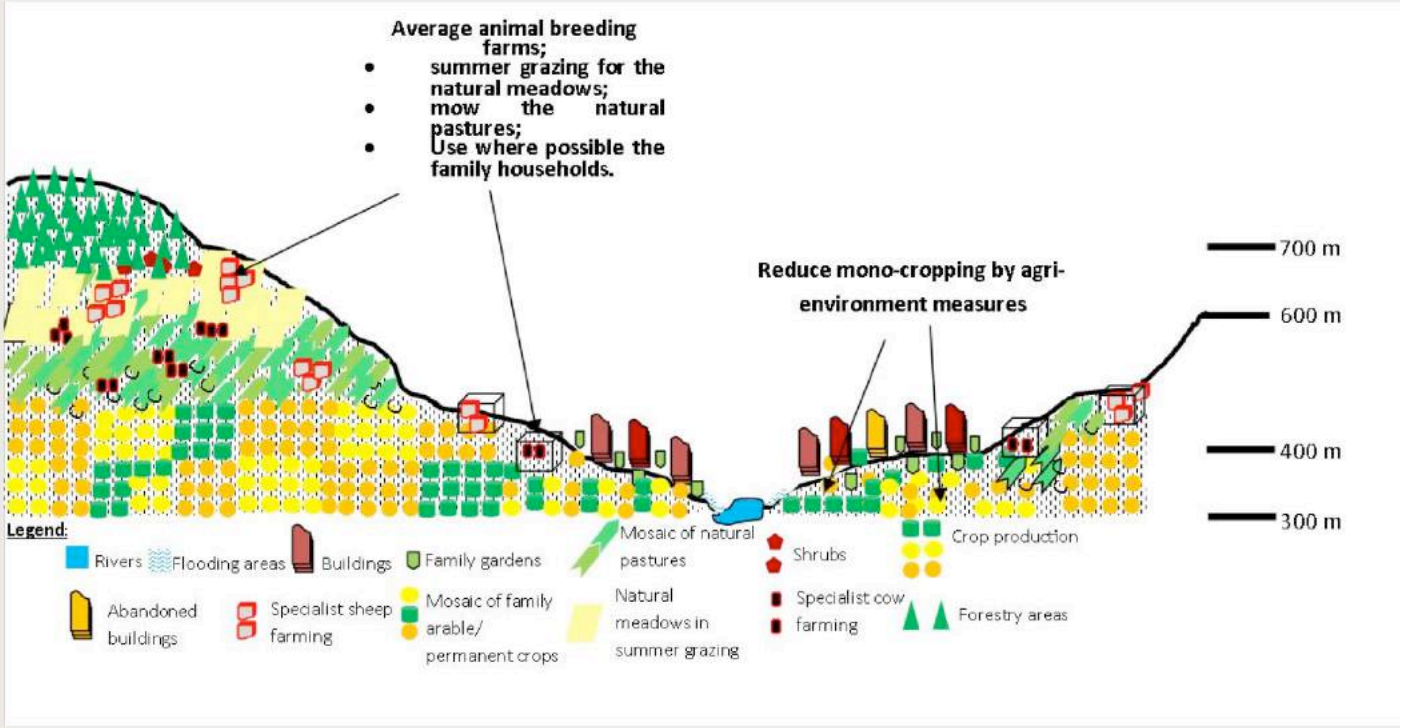


The vision of HNV farming as related to the statement of pastures & grasslands differ among the remote and peri-urban communes. Twice as many respondents from the remote communes are more optimistic about the preservation of pasture and grasslands, to be used in the same conditions (Fig 29.a). Regardless of the location of the communes, opinions about the abandonment phenomenon and the technological shifts are similar.

Opinions about the issues solving to maintain HNV farming differs: a better farmer cooperation and selling opportunities are more expected by people from the remote areas, which is expected in a way because people from peri-urban areas have easier access to the markets from the town of Cluj-Napoca (Fig 29.b). However, the peri-urban area expressed the need for more environmental friendly techniques which also assures a higher farm productivity.

Biodiversity-rich landscapes: how will they function in 2030?

Fig. 30. Transect in the vision scenario (2030)



<u>Farming vision:</u>

- 300– 500 m: arable land – reduce mono-cropping after applying green payments subsidies; consolidate the existing farms and provide public goods by production diversification;
- 500– 700 m: sustain average animal breeding farms by promoting an equilibrium between cows and sheep species; these farms should be mainly developed using family labour force; to use pastures areas alternatively for hay mowing;

The key HNV habitats protected on the permanent meadows and pastures.

<u>Market vision:</u>

- Create a local brand to promote high added value animal breeding products linked with their agri-environment function; All farmers from the region produce and sell under the same brand;

Problems that need addressing to achieve the HNV vision

Tab.8. Identified gaps to achieve the HNV vision

Dimension	Gaps
Good Governance	- land ownership structure (no clear ownership status); hunters/urban competition; - farm structure (small size households with small plots that dominated in terms of number; and big size farms that are predominant in terms of agricultural area in use); - lack of farmer's association; - access to CAP payments (pillar 1) and agri-environment packages for small farms; or for farms coming from specific communes; - lack of Natura 2000 special payments for farmers working inside of the protected area;
Technical	- poor conditions for common/private pastures (large shrubs areas; low productive factor); - hay production: low yields; extensive labour demands for manual mowing; high time consumption for hay production; - high agri-environmental demands specific for the agri-environment packages and in the Natura 2000 management plan; - high sanitary/veterinary mandatory regulation that act as barriers to on-farm processing and direct sales;
Economical / Marketing	- poor economic viability of HNV farming system (especially family households); - low outputs from the HNV households; sales mainly for no regulated market (direct sales); - no high value added products for the bigger commercial farms; lack of product differentiation; - marketing chains dominated by high multinational super markets; - no local food processors (milk; meat).
Social	- poor infrastructure and harsh farming and living conditions; - lack of information and entrepreneurial skills; - economic pressures outside LA to obtain better living standards; - people in old age;

Who are the actors to get involved in the process? How?

Farmers

Local politicians and NGOs

The LAG

Researchers

Private consultants

Food processing companies

Work together to introduce social, marketing and technological innovations!

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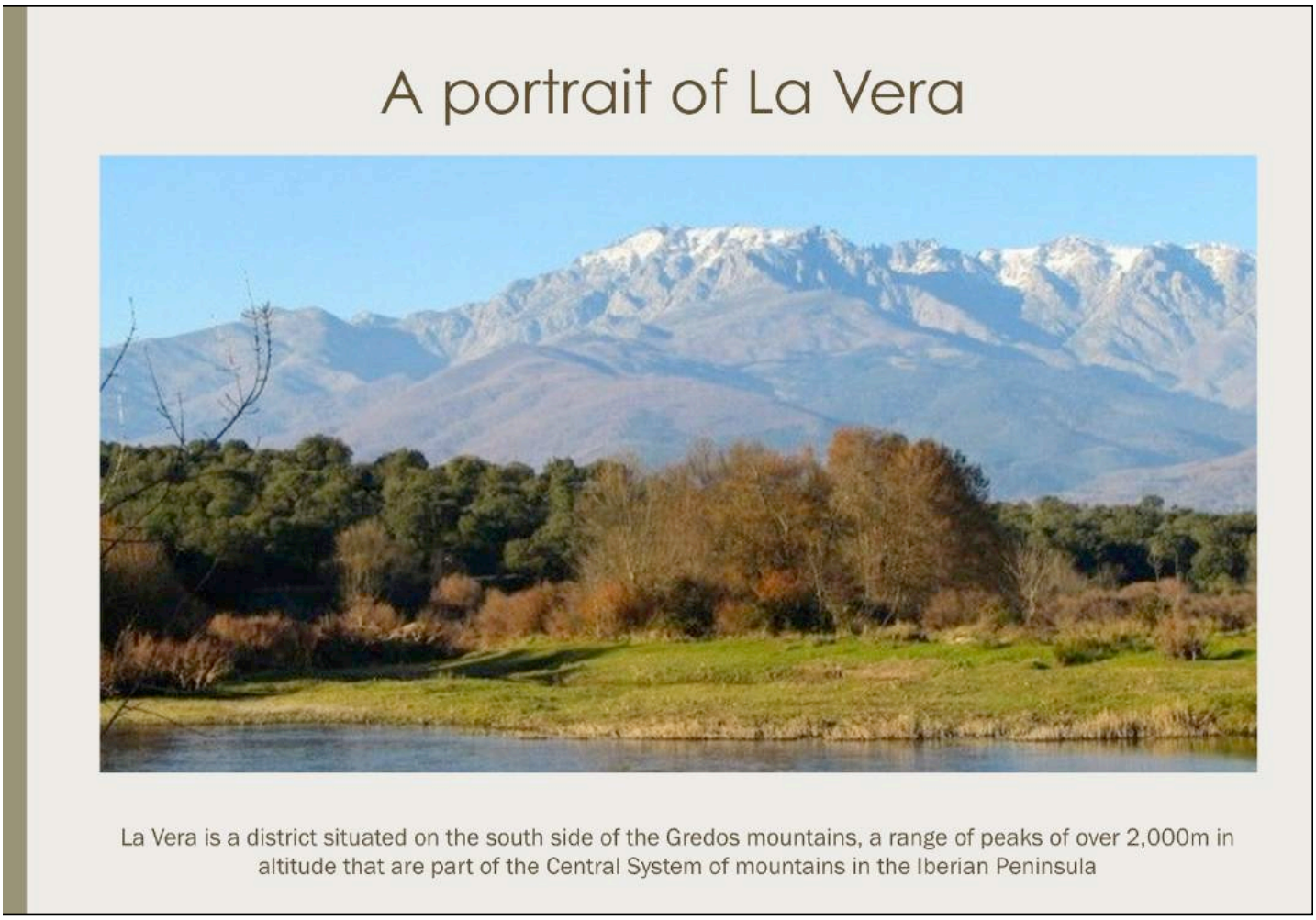
A thematic network on High Value Farming
Learning, INnovation & Knowledge

LEARNING AREA « LA VERA » (Extremadura - Spain)

A BASELINE ASSESSMENT

Authors:Pedro M. Herrera, Julio Majadas, Guy Beaufoy, Remedios Carrasco and Javier García
Date: July 2017

This project has received funding from the European Union Horizon 2020 research and innovations program under Grant Agreement No. 696391



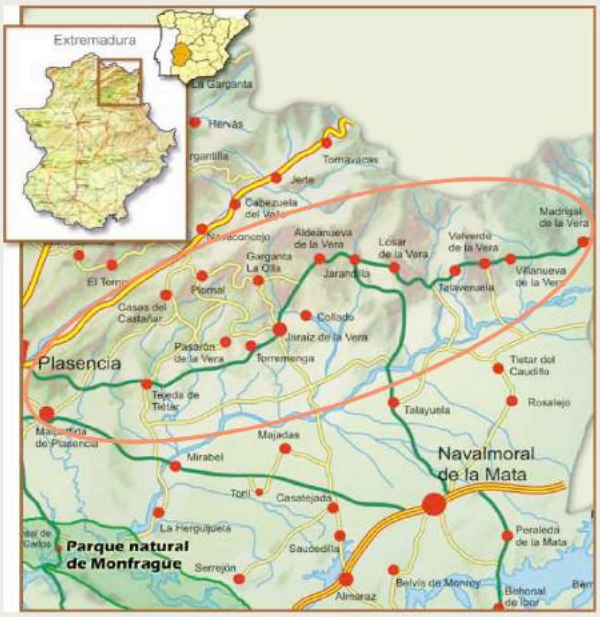
A portrait of La Vera

La Vera is a very special district, combining classic mountainous beauty with a favourable orientation and benign climate, factors which have favoured human occupation since prehistory.

The southern edge of the district is the floodplain of the Tiétar river, which today is dominated by intensive cultivation of tobacco and red peppers for pimentón (paprika). Until the 16th century, the valley was covered with woodlands of Pyrenean oak, holm oak and cork oak, with an extensive pine forest occupying the sandy soils of the river banks. These flatlands, at 300-350m altitude, were an unhealthy area with diseases such as malaria; consequently, the main human settlements were at mid-altitudes, around 400-600m, in the Gredos foothills. This is where the main farming took place, as the climate is also slightly more gentle and the plentiful rainfall and numerous small rivers coming down from the mountains allow for very diverse cropping and livestock systems.

Today La Vera above the irrigated river valley is dominated by a landscape of treeless peaks rising to over 2,000 metres to the north, descending in steep slopes with large masses of Pyrenean oak woodlands interspersed with grass and scrub pastures, and terraces with tree crops such as olives, figs and cherries in the foothills.

A mountain district in the north of Extremadura (Spain)



La Vera is in the centre-west of Spain, in the north-east of Cáceres province, in the Autonomous Region of Extremadura. The regional government is responsible for farming and environmental policies, within the State and EU frameworks.

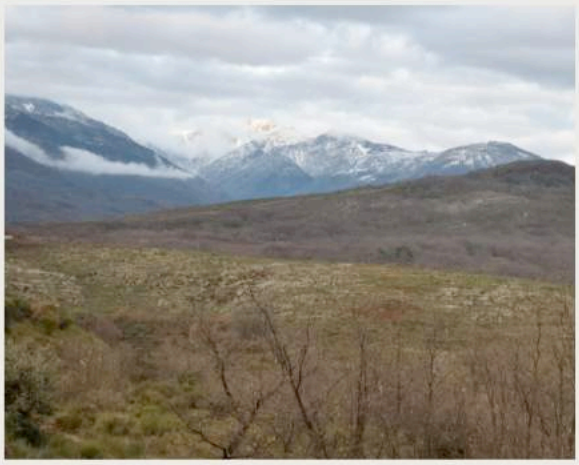
Location

La Vera was originally called La Vera de Plasencia, the name of the cathedral city at the western end of the district, with approximately 40,000 inhabitants.

On the southern edge is Navalmoral de La Mata (population 19,000). The regional capital of Mérida is 200km to the south; in fact La Vera is more in the influence of the State capital Madrid, at a similar distance to the east.

To the north-east is the continuation of the Tiétar river valley, reaching up into the mountains of the Central System and connecting Extremadura to the meseta of Castilla y León

The limits of the Learning Area



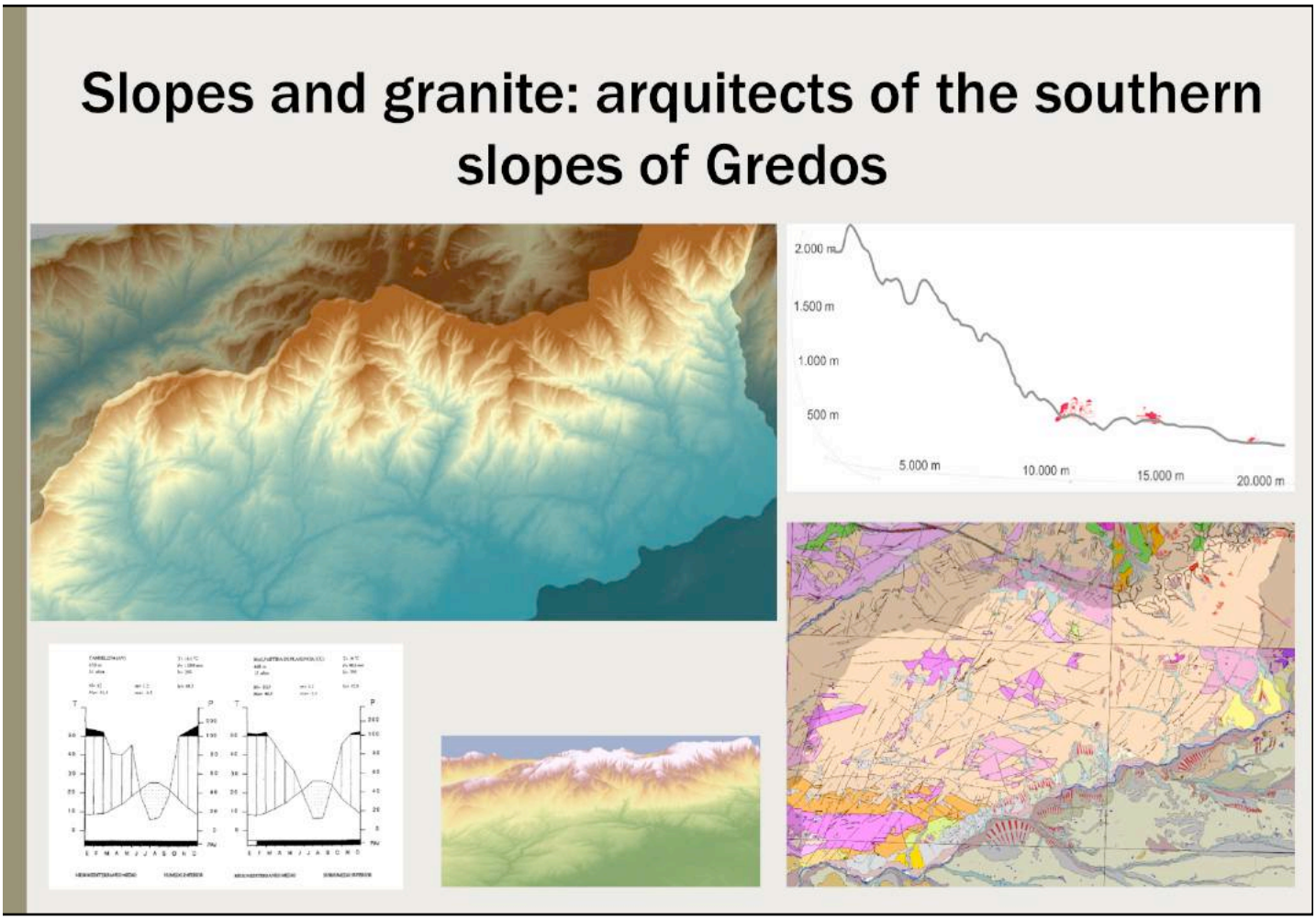
La Vera district contains 19 municipalities, which define the administrative boundaries of the area. However, HNV-Link is targeted on the mid-higher altitude parts of the district, and on the pastoral land that dominates these parts. This is where the majority of Natura 2000 habitats are found, in a mosaic largely created by centuries of pastoralism. The 3 western municipalities (in blue) are not included in the Project, as they do not have the typical uplands of La Vera

2014	Municipalities	Settlements	Extent	Population	Density
La Vera	19	21	883 km^2	25.072 inhab.	28,39 inhab/km^2

LA limits

La Vera is a historic district, dating from the Middle Ages and the communities that were established around the city of Plasencia and evolved into the current pattern of settlement.

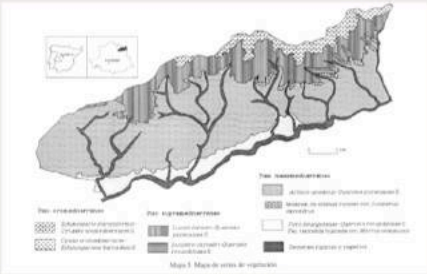
La Vera contains 19 municipalities and 21 towns or villages, but is not itself an administrative unit (there are certain planning functions). The dominant municipality is Jaraíz de La Vera, at the south-western side of the Learning Area.



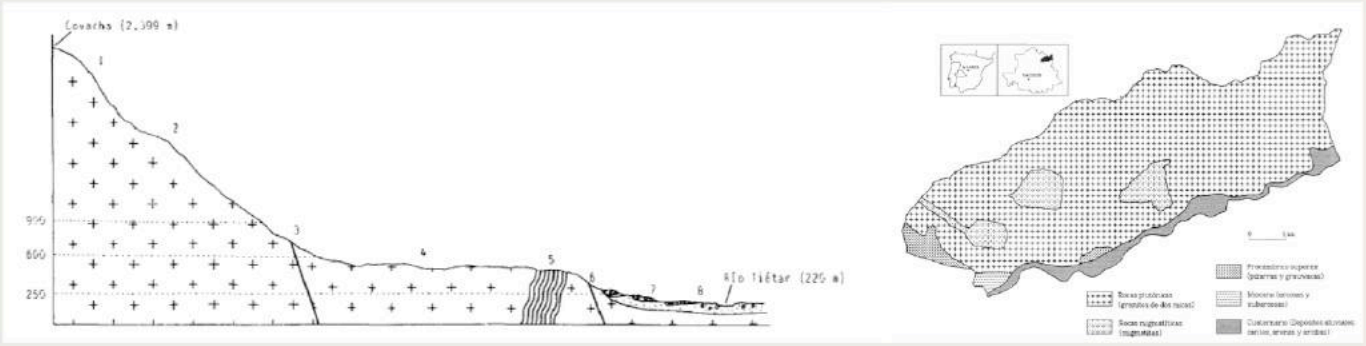
La Vera is a massive slope of **great lithological homogeneity** from the peaks of the Central System to the river Tiétar valley. The gradient is a defining factor for the characteristics of the area.

The **climate** is typical of Mediterranean mountain zones, also with a clear **altitudinal differentiation**. However, the southern orientation and **atlantic influences** from the west have the effect of reducing the extremes of the climate and favouring **seasonal rains**. At a local level, key factors are **orientation** (shady or sunny), position on the slope, and exposure.

Soils and physiographic units

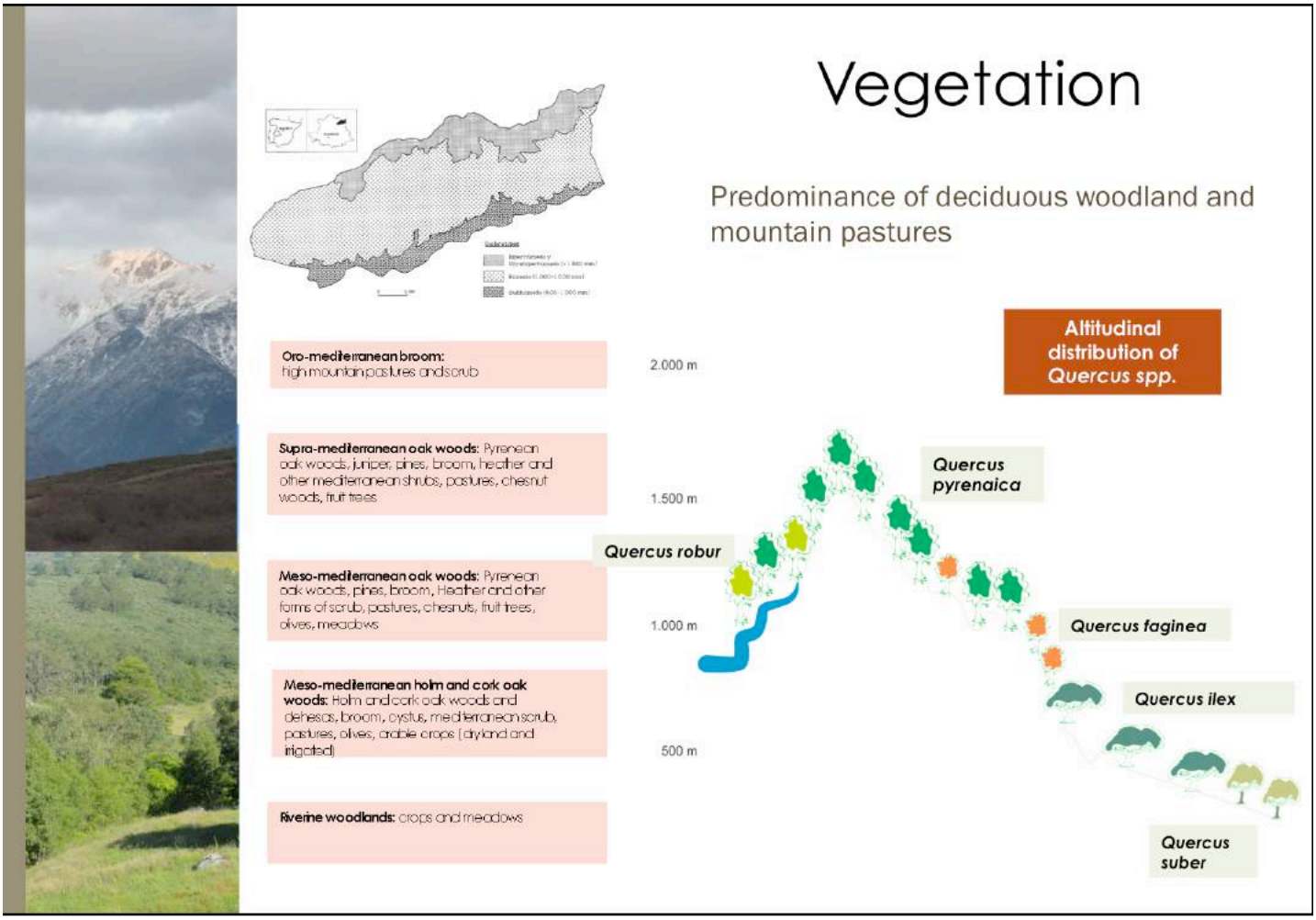


UNIDAD FISIOGRÁFICA	Lithology	Altitude	Dominant soil types
I. Peaks	Granite	>1.200	Afloramientos rocosos, Litosoles dístricos, Rankers
2. Slopes	Granite	800-1.200	Rankers, Cambisoles húmicos, Afloramientos
3. Foothillls	Granite	600 -800	Regosoles - Litosoles - Cambisoles dístricos, Afloramientos
4. La Vera platform	Granite	400 - 600	Regosoles-Cambisoles dístricos, Afloramientos, cambisoles crómicos
5. Southern escarpment	Granite	250 - 400	Regosoles - Litosoles - Cambisoles dístricos, Afloramientos
6. Terraces and alluvial deposits of the Tiétar floodplain	Alluvial	250	Luvisoles crómicos, Cambisoles crómicos, Fluvisoles dístricos, Cambisoles éutricos



Soils and physiographic units

La Vera can be divided into 6 main physiographic units, as shown in the slide. The HNV LINK Project focuses mainly on the foothills, slopes and peaks, which is where the main pastoral resource is located, and also including the dehesas of the lower-altitude platform. The alluvial floodplain is not included.



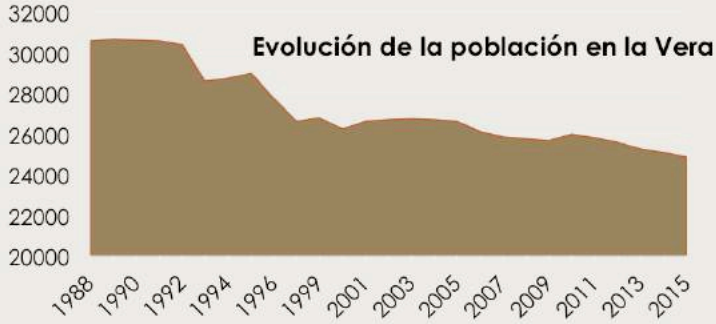
Vegetation

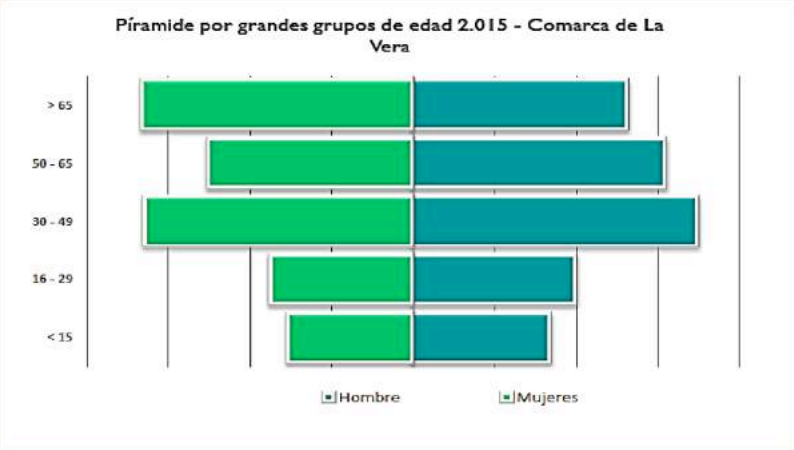
The higher parts of the mountains are dominated by extensive areas of mountain broom, with smaller patches of nardus grassland and fragments of bogs and mires.

The dominant vegetation at mid-altitudes is Pyrenean oak (*Quercus pyrenaica* Lam.), merging at lower altitudes into evergreen oaks (Holm and cork). Historic and current landuses have created a complex mosaic of woods, scrub and grasslands, interspersed with tree crops.

A population in decline in a highly appreciated area

Key indicators for La Vera	
Inhabitats living in low density áreas <10 hab/km^2 1996	449
Rurality index 1996	1,62
Inhabitats living in low density áreas hab/km^2 2014	534
Írurality index 2014	2,13
Dependency index 2007	48,06
Dependency index 2014	48,44
Work turnover rate 2007	113,99
Work turnover rate 2014	85,61
Male rate 2007	103
Male rate 2014	102,98
Population 1996	27.774
Population 2014	25.072
Population loss (1996-2014)	-2.702
% population lost	-9,73%
% Population>65 años (1996)	20,32%
% Population >65 años (2014)	24,61%
Ageing (1996-2014)	4,29
Unemployment rate 2007	7,30%
Unemployment rate 2015	16,21%

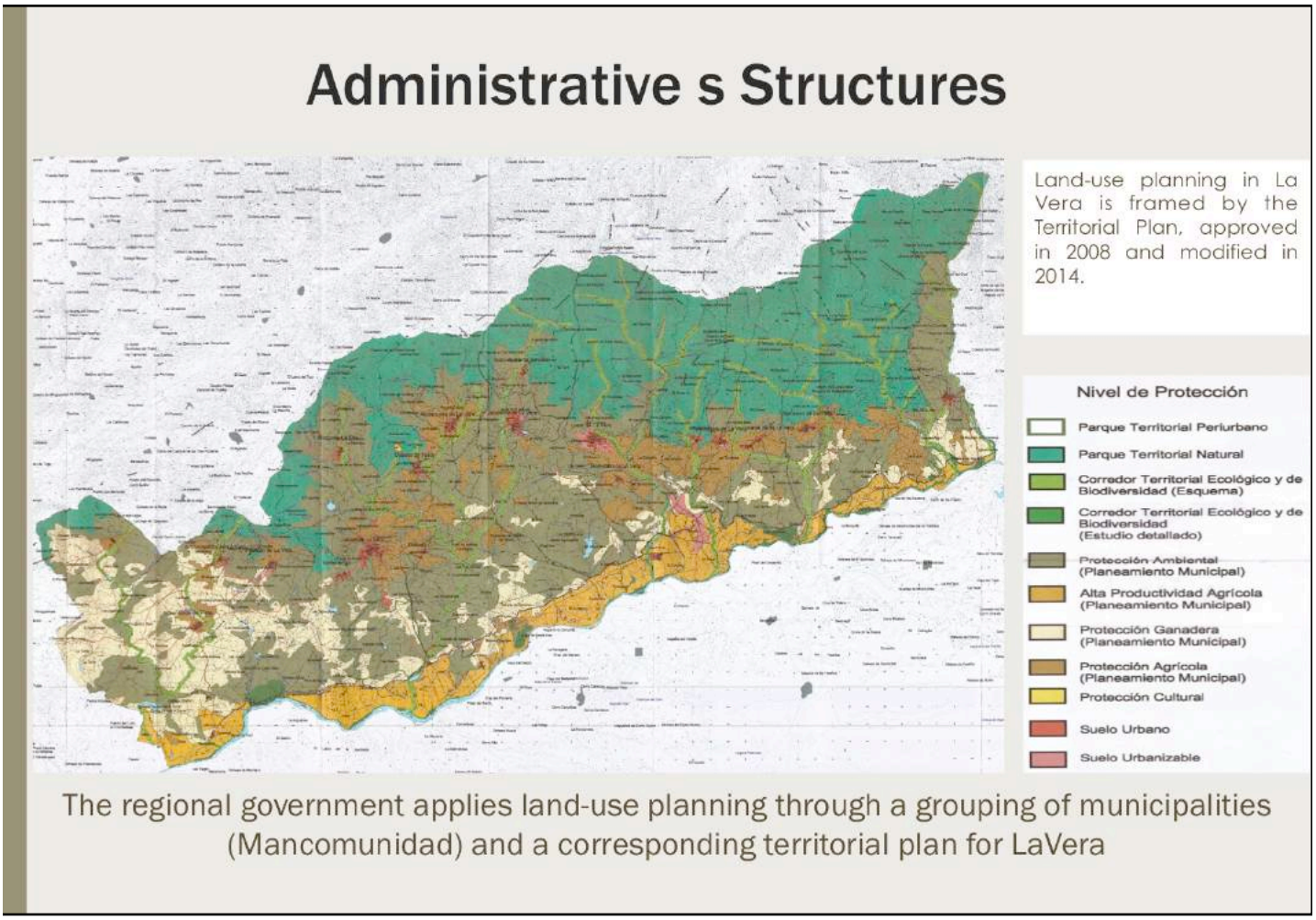




Population

The current population of La Vera is around 25,800 inhabitants, although this figure is doubled during the months of peak tourism. The largest town is Jaraíz de La Vera, with 6,400 inhabitants, a further 6 municipalities have populations of 1,000 to 3,000, and the rest are below 1,000 (7 villages have fewer than 500 inhabitants).

The population trend has been generally negative since the last quarter of the 20th century, with a 18% decline during the past 30 years.



Administrative structures

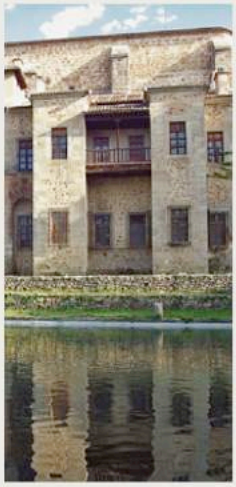
The 19 municipalities are grouped in a Mancomunidad since 1977. The functions of the Mancomunidad are largely co-ordination of certain services (rubbish, social services, sport) and territorial planning. There is a Territorial Plan for La Vera which regulates land-use planning within the framework of the regional legislation. There is also a Rural Development Strategy, produced recently by the LAG through a participatory process.

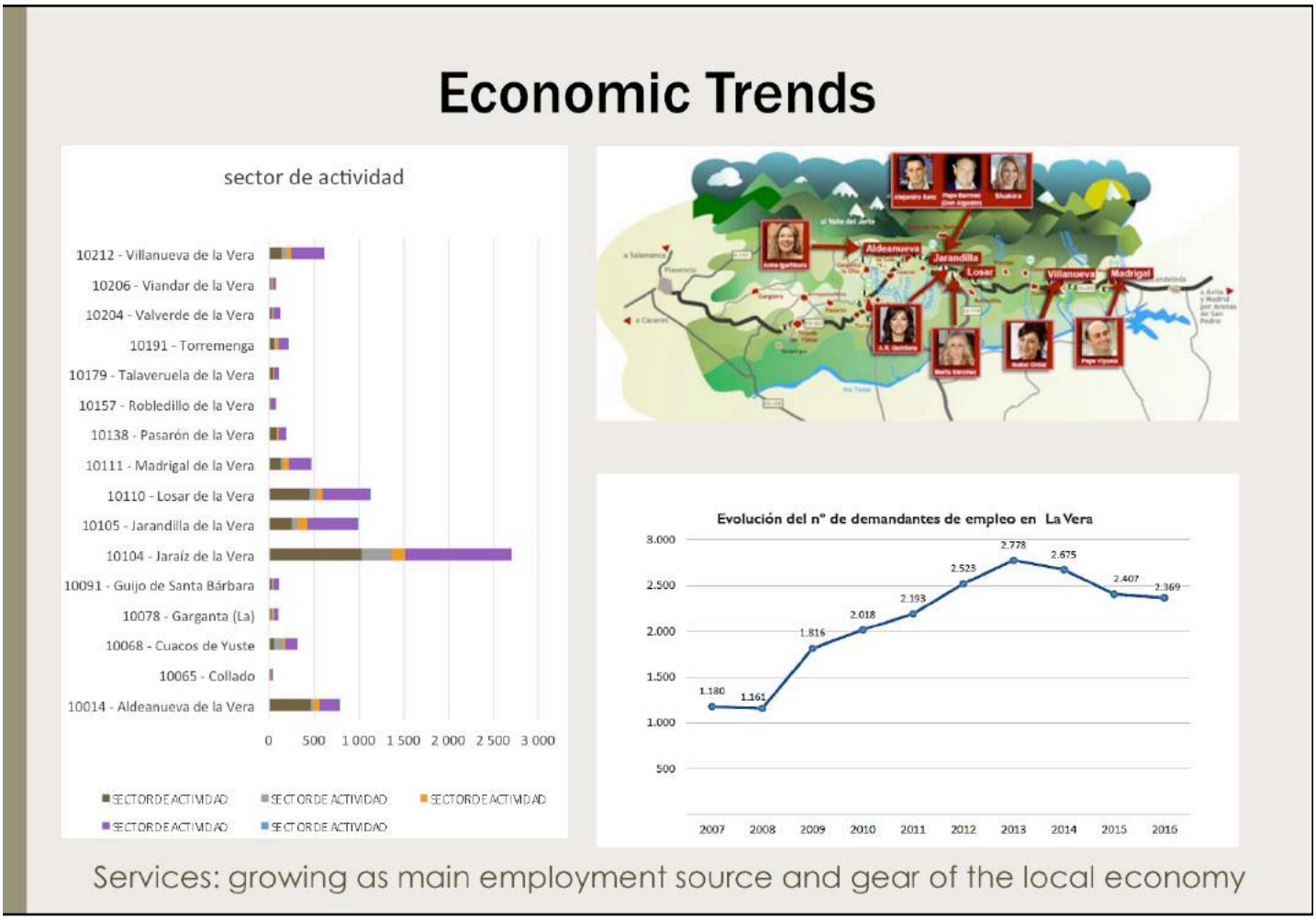
The municipalities have basic competencies for urban land-use planning. They also own large areas of public grazing and forest land (monte público) – see later slide.

Culture and rural society

La Vera has a common set of socio-cultural and landscape characteristics, especially in the HNV areas above the lowlands:

- Four towns designated as "Historic Artistic Towns"
- Mountain-style village architecture, with narrow streets, houses of stone, timber and adobe, carved wooden balconies
- Water channels in the streets that are part of the traditional irrigation systems
- Several local fiestas of touristic value, many of them linked to pastoral culture
- Grand heritage buildings such as the **Parador in Jarandilla**, and the **Monastery of Yuste**.





Economic aspects

Although cropping is the main activity in La Vera, its capacity of employment is decreasing. Agriculture includes, tobacco, paprika peppers, cherries, raspberries, olives and other tree crops. Livestock is less economically significant. Organic crop production has started to increase in recent years, but is still not significant.

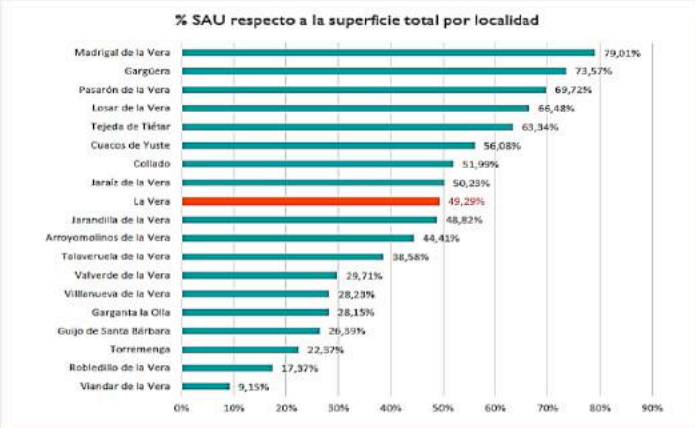
The secondary sector occupies about 16% of the population, and includes companies that process local agricultural products (paprika, olives, cheese, fruit) and products from outside the district (a large chicken slaughterhouse) but is mainly concerned with local services and construction.

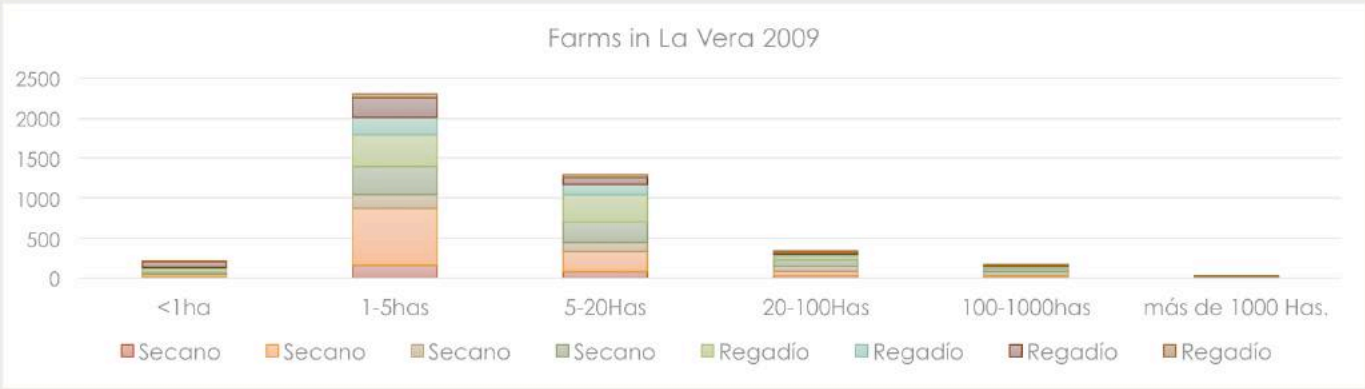
The services sector is less developed than the national average, despite the enormous tourism demand in the área, but it is consolidating as the main employment activity, specially for young workers. Tourism in La Vera is largely associated with summer and Easter holidays, although it is also an important weekend destination, due to the proximity to Madrid. Rural tourism is nevertheless not well developed in La Vera, and the concept of agri-tourism is practically unknown.
Much of the focus of tourism is on the mountain rivers as a bathing resource, leading to considerable environmental impacts on these (several of the rivers are Natura 2000 sites).

Local agricultural products, such as goat meat and cheeses, are present but not promoted strongly by the restaurant sector.

Farming and Land Use

2006 census	Landuse	Extent (Ha)
Dryland	Arable	1487,2
Dryland	Permanent crops	2383,8
Dryland	Perm. Pasture	22366,31
Dryland	Other	8695,14
Irrigated	Arable	4087,51
Irrigated	Vegetables	9,12
Irrigated	Permanent crops	819,84
Irrigated	Perm. Pasture	1209,95
TOTAL		41.158



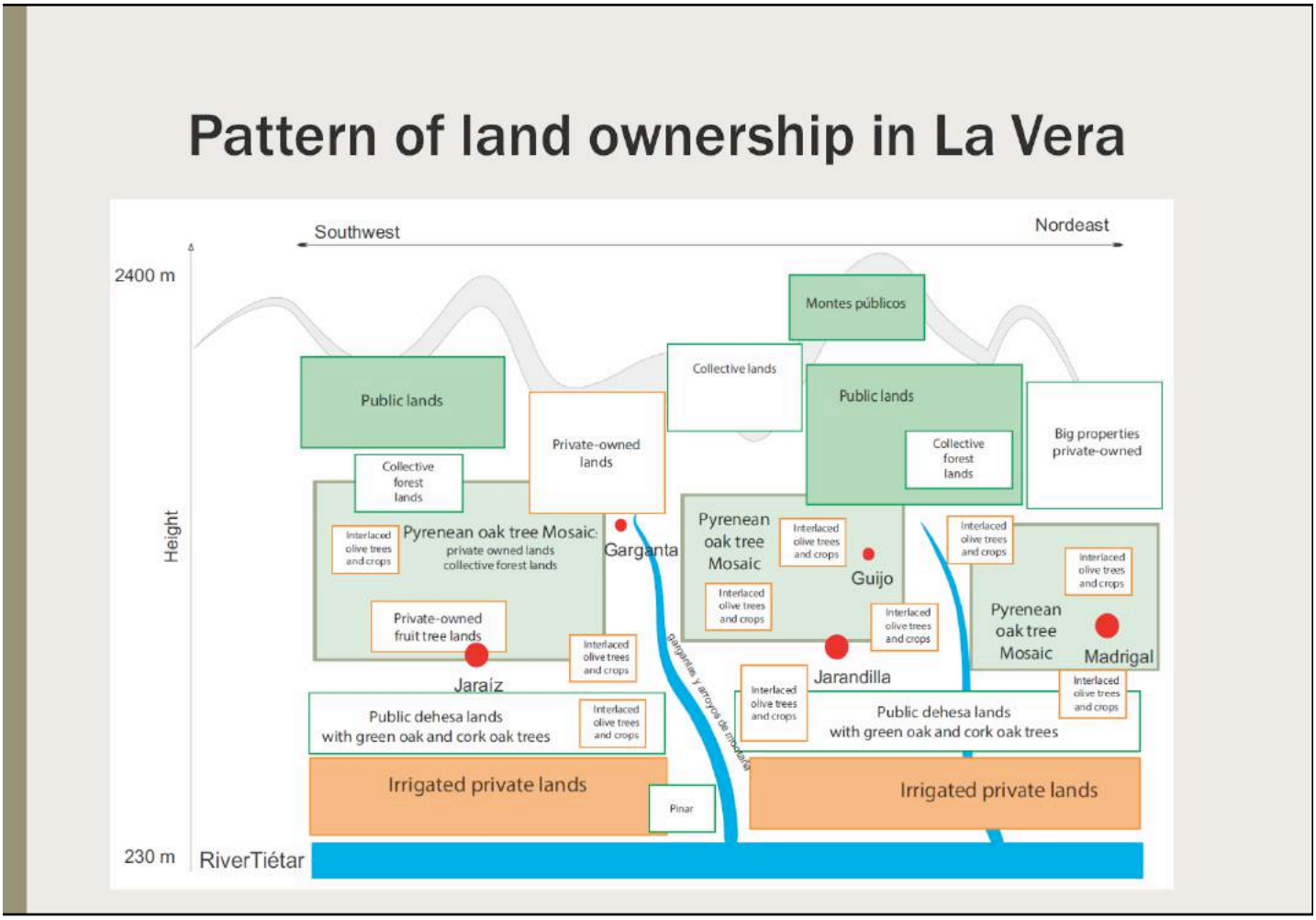


Farming and landuse

More than 50% of the UAA is under permanent pasture, but crops are economically dominant. Tobacco and paprika peppers are now grown almost entirely in the irrigated river valley, but traditionally were grown also up to mid-altitudes on terraces. Nowadays the mid altitudes are mainly under tree crops, especially olives, cherries, figs, chestnuts, and more intensive crops such as raspberries and kiwis.

Note that the figures above do not include forest land, which covers an approximately similar extent as farmland, and where grazing has traditionally been a main use. The differences between useful farmland and total Surface are related to the position on the slope, being more forestal the municipalities which limits with the top of the mountains and more farmland the lowlands municipalities.

Tobacco and paprika peppers in the floodplain, olives and other fruits in the foothills

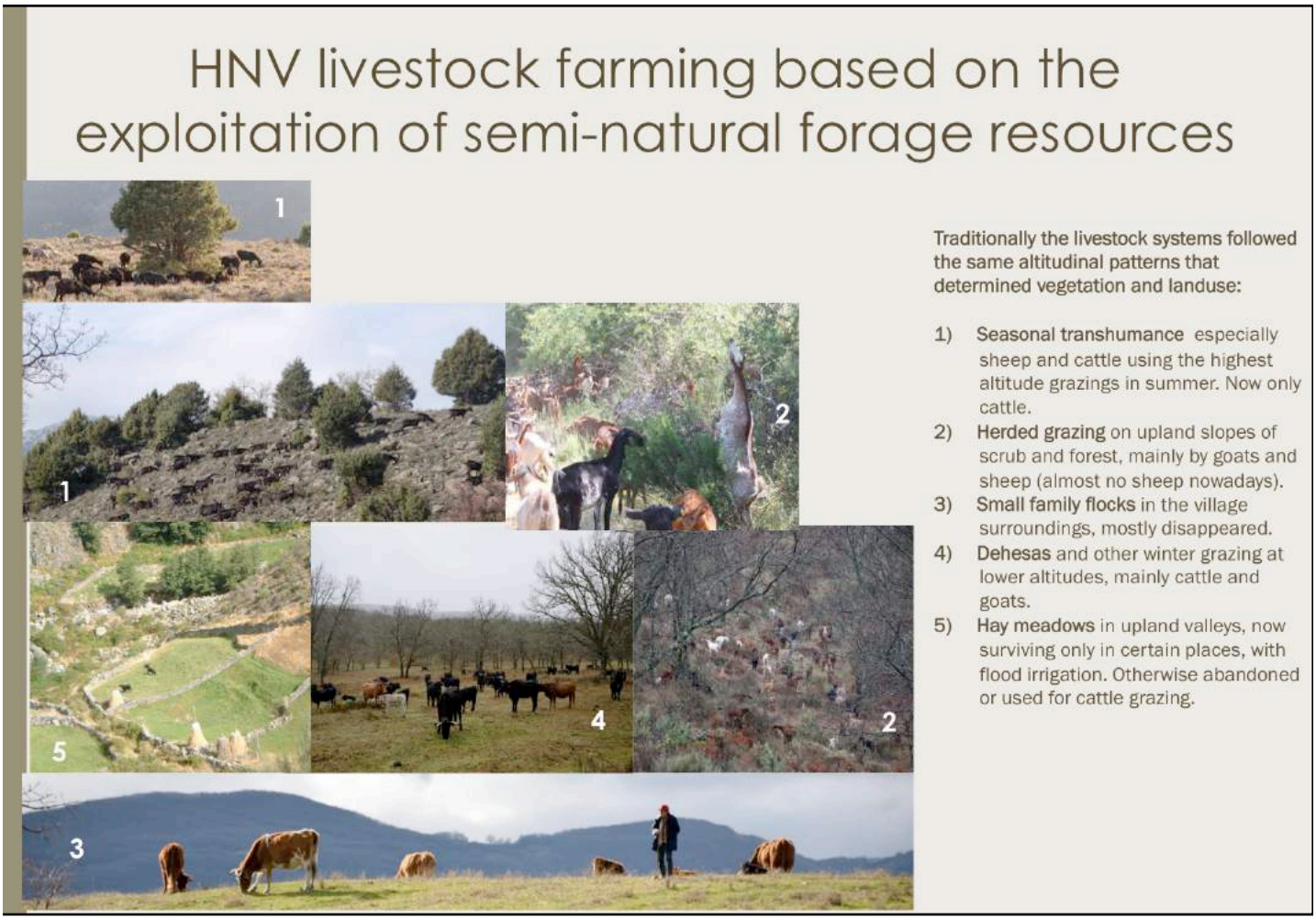


Pattern of land ownership in La Vera

Land ownership, access to resources and decision-making over the management of the land resource are key questions for understanding the HNV farming system in La Vera. The land ownership structure is complex, including public land used in common, private land used in common, and private land under individual use.

In broad terms, the diagram shows the following pattern:

- The highest mountain areas are mostly private lands, in many cases owned in common by private share-holders (many local people have inherited small shares, a few people have accumulated a large amount), or owned by big private landowners (especially in the north-east of the district). Hunting is a main activity on these lands, although grazing is still common. All municipalities have one or more public lands, used for a mix of grazing and forestry activities. There are 31 of these public “montes”, dominating the uplands of the district and also including dehesas at lower altitudes, where there are also private grazings. Public “montes” cover a total of 18,600 ha. Their management is the responsibility of the regional forest authorities. The grazing rights are let to local farmers on an annual basis. Only one of these “montes” has a detailed management plan, for the others there is a simple description (often out of date) of the number of animals permitted and the rules the graziers should follow.
- In 1 municipality (Losar) the public land of the municipality extends to the high mountain (this is the largest monte público in La Vera); in all the other municipalities, the higher altitude land is in private hands.
- At the altitude of the main towns and villages there is a dense mosaic of private farmland minifundia and forest parcels (sometimes on shared ownership), mixing in many areas with public lands.
- In the river valley, the land is mostly larger scale private farmland.



HNV livestock system

Traditionally, practically all of the uncropped land in la Vera was used for grazing, with strong seasonal patterns. The higher altitude herbaceous pastures were used in summer by large flocks of shepherded sheep, now largely disappeared and replaced with suckler cattle which can be left largely unattended for several days.

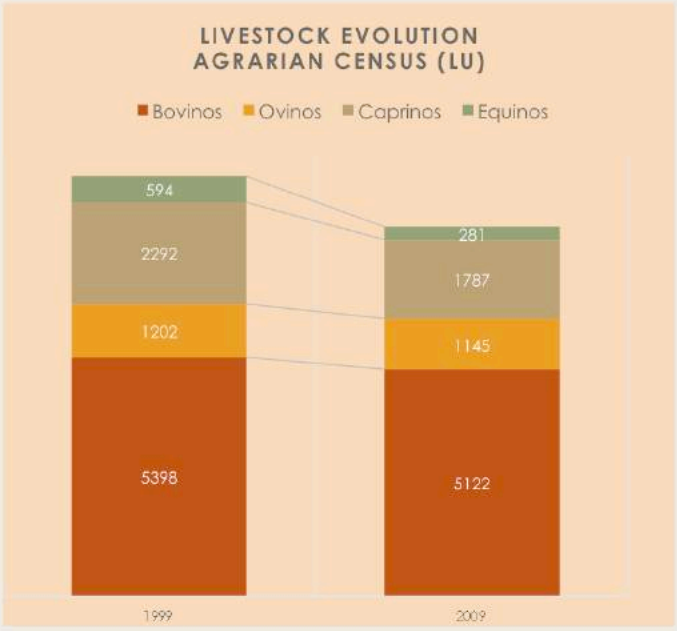
The upland slopes are a mosaic of wooded and open land with a mixed use of forestry (firewood, mushrooms, previously charcoal) and herded goat grazing/browsing.

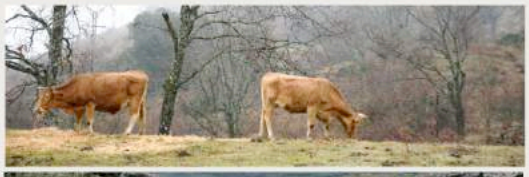
At lower altitudes are dehesas and other grazings used mainly in the winter by cattle and goats. Short transhumance (1 or 2 days) from the lower altitudes to upland and high mountain summer grazings is still practised by significant numbers of cattle and goats, but is in decline.

Traditionally hay meadows were widespread in the upland valleys, but most have been abandoned or are used for seasonal cattle grazing. Irrigated hay meadows survive in some places, such as Guijo de Santa Bárbara, produced hay for cattle.

Generally, suckler cattle spend Winter in the public dehesas of the foothills of La Vera or in rented dehesa pastures outside La Vera. In the summer they move to higher mountain pastures. Goats nowadays tend to be found grazing at mid-altitudes and in the foothills, with not so many making seasonal movements to the high mountains.

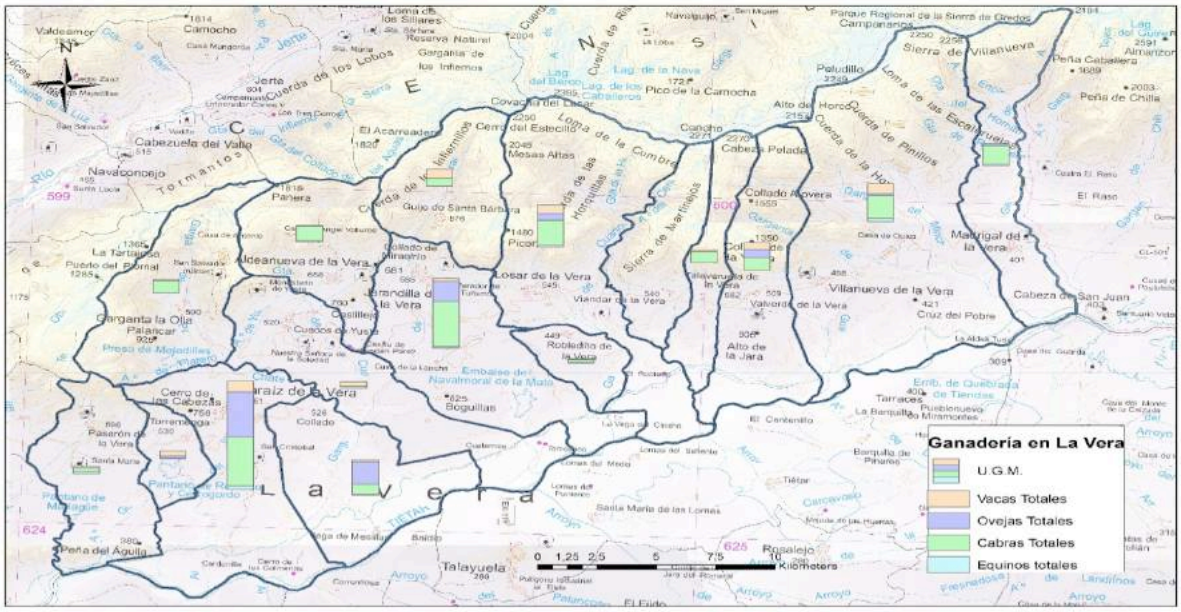
Declining livestock production



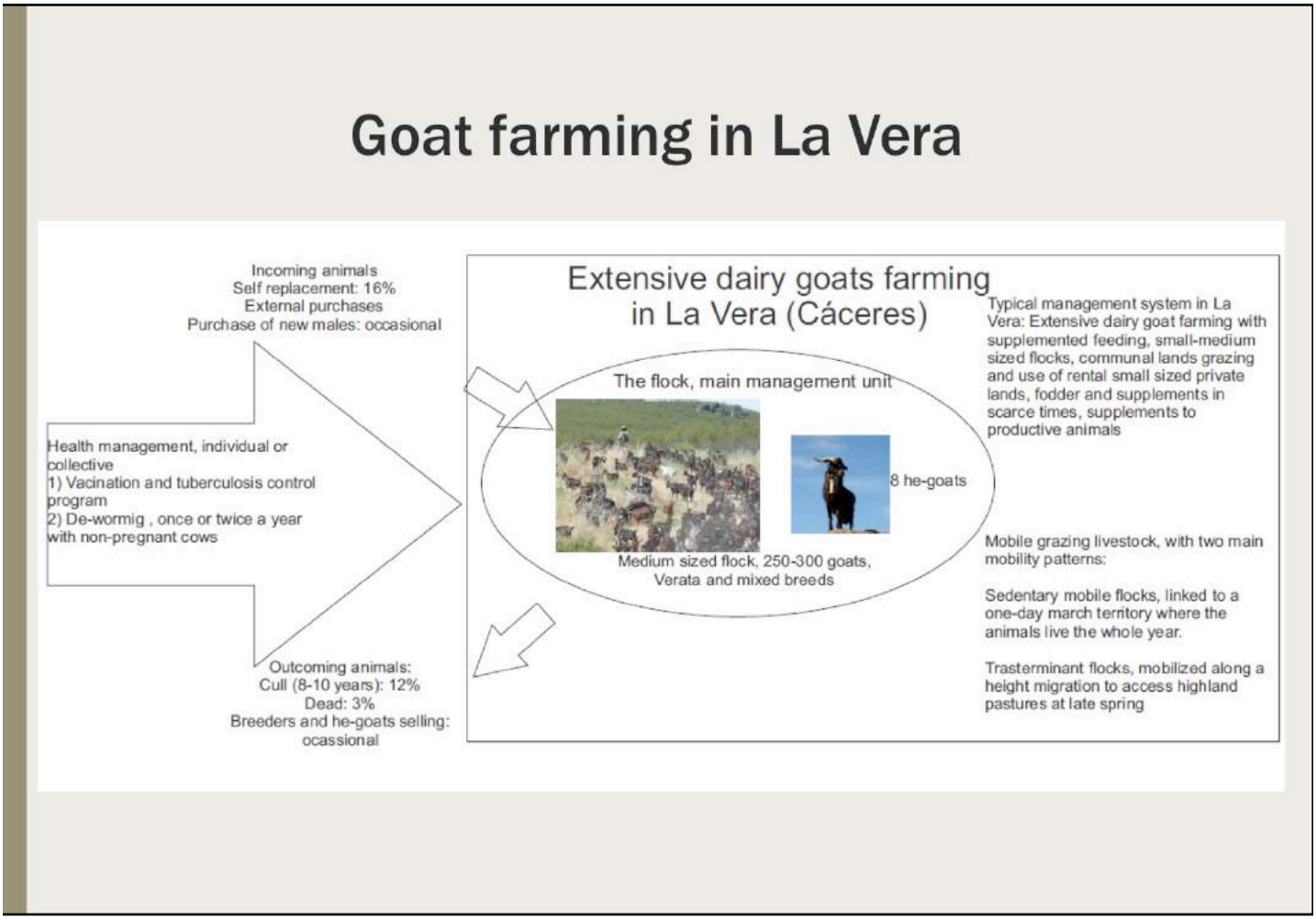


The figures show a descending pattern in livestock farming. Despite the difficulty of getting proper figures, our social analysis shows that this declining is affecting more heavily to grazing livestock, specially dairy goats, that is being forced to settlement or abandonment.

Distribution of livestock by municipality (2014)



Data from MAPAMA (2014), author's own graphs



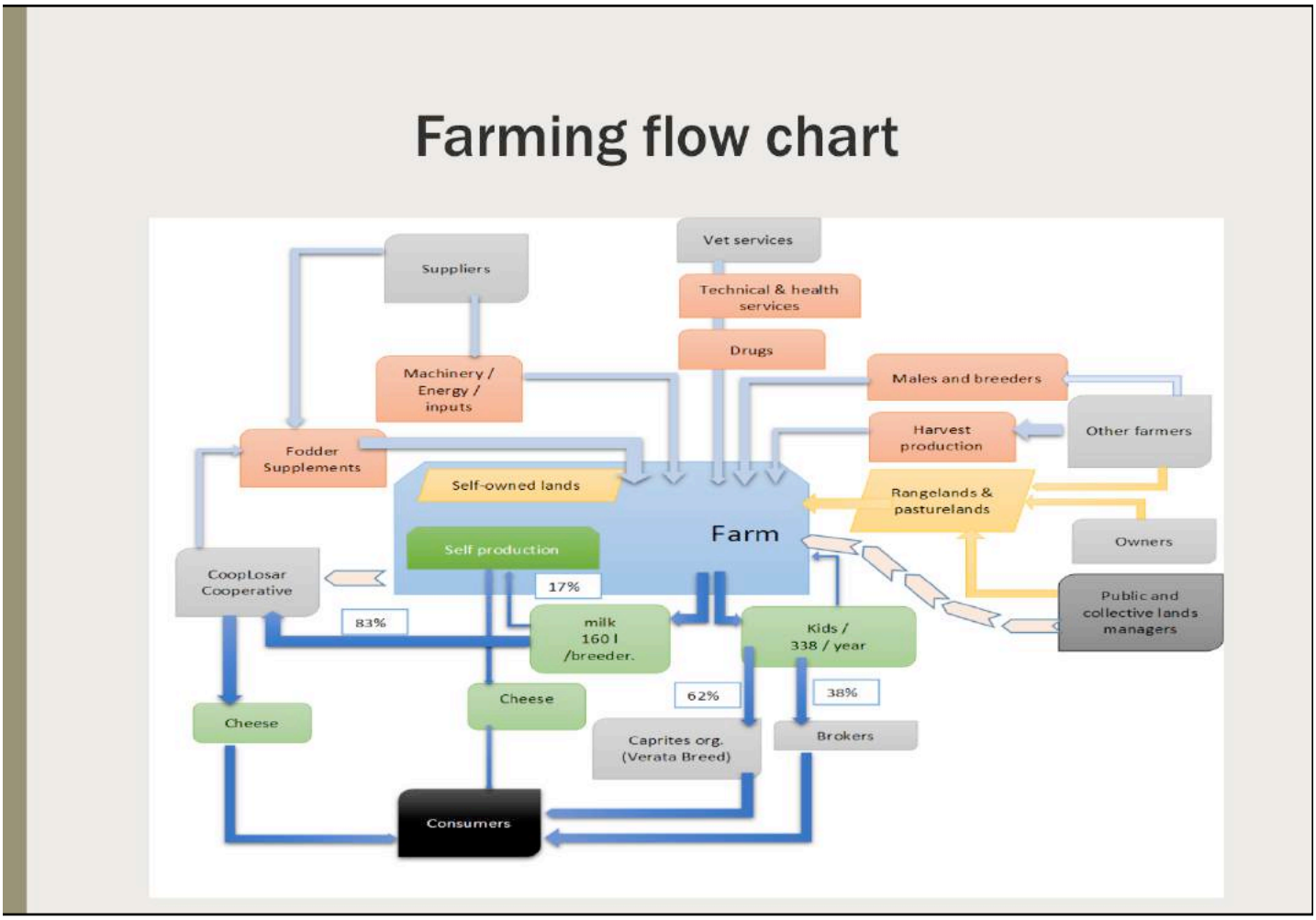
The typical extensive goat farming system in La Vera.

Each holding is different, and there is a range of feeding systems, from those that are almost entirely dependent on semi-natural forage at one extreme, to those that are fed largely indoors on concentrates at the other.

As far as there is a typical system, this is a dairy goat farming system based on extensive grazing of a mosaic of semi-natural vegetation types, with some supplementary feeding (cereals and concentrates). Broadly speaking, we can define two sub-types:

- **Traditional extensive system**: small flocks (200 animals approx.), feeding almost exclusively from grazing and browsing on unfenced comunal pastures, mainly in the uplands, milking by hand, rudimentary infrastructure.

- **Semi-extensive system:** larger flocks (275 animals approx.), births spread through the year, more supplementary feeding, more housing, better infrastructure, sometimes mechanical milking.



Farm management flow chart

Pasture use

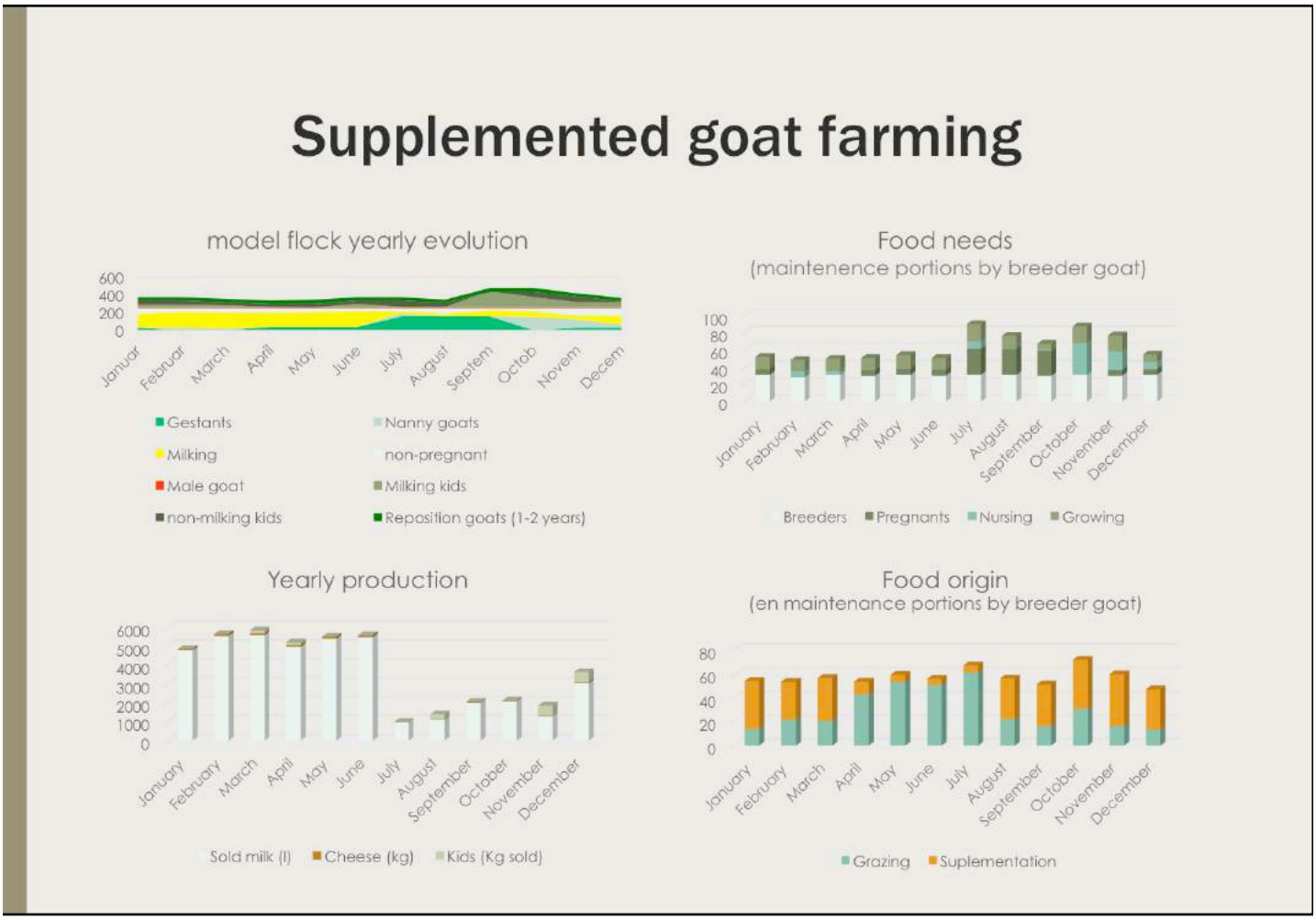
- Basically two strategies: 1) daily grazing circuit from farm base, possible variations during the year. 2) local trasterminance (DEFINE) between foothills and mountains.
- Goat farms in particular have very limited own land (just the farmstead, or shed and corral). Grazing land is usually rented, either public common land or private land often shared with hunters.
- Approx apparent average stocking density 3.2 goats/ha (without counting common land)

Feeding

- HNV system is based on grazing as main source of feed
- Goats typically graze more than 6 hours per day
- Poor infrastructure and facilities. Approx half of farms use manual milking.
- Mobility is the best strategy given the absence of infrastructure for sedentary systems
- All animals receive some supplementary feeding, typically concentrates (0.5 a 0.8 kg animal/day, 225 kg/ year) and in many cases hay and straw
- In some limited cases (38%) forage is cultivated on the holding, generally less than 2ha.
- Concentrates are given at a rate typically of 1.5 kg per litre of milk produced

Animal health

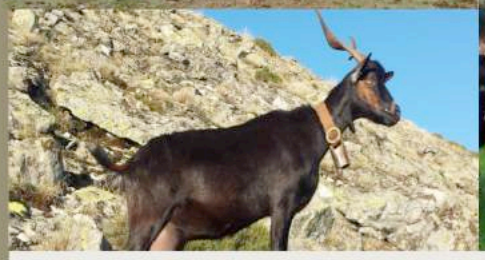
- By the individual Farmer or through an Animal Health Association (*Asociación de Defensa Sanitaria)*
- Vaccines
- TB control and eradication programme by authorities
- Parasite control once or twice per year, when goats are dry

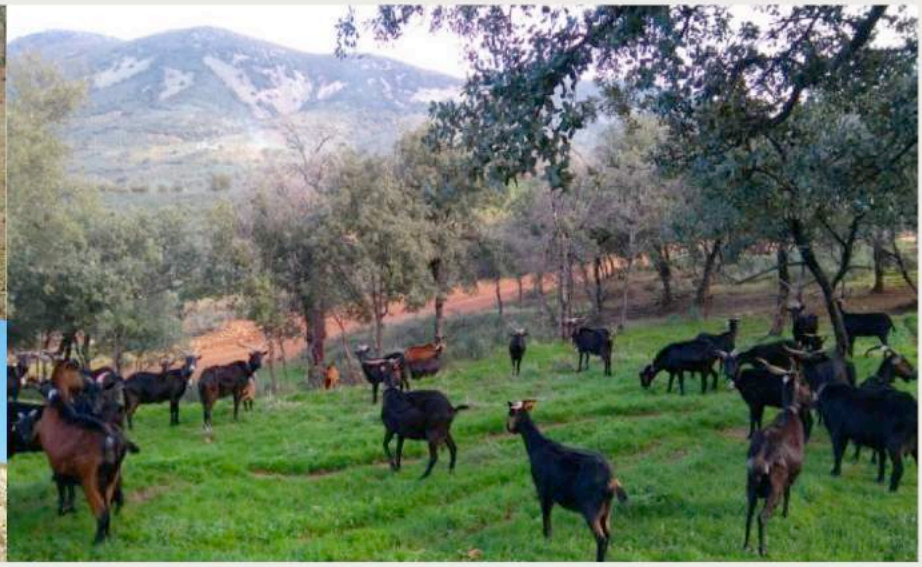


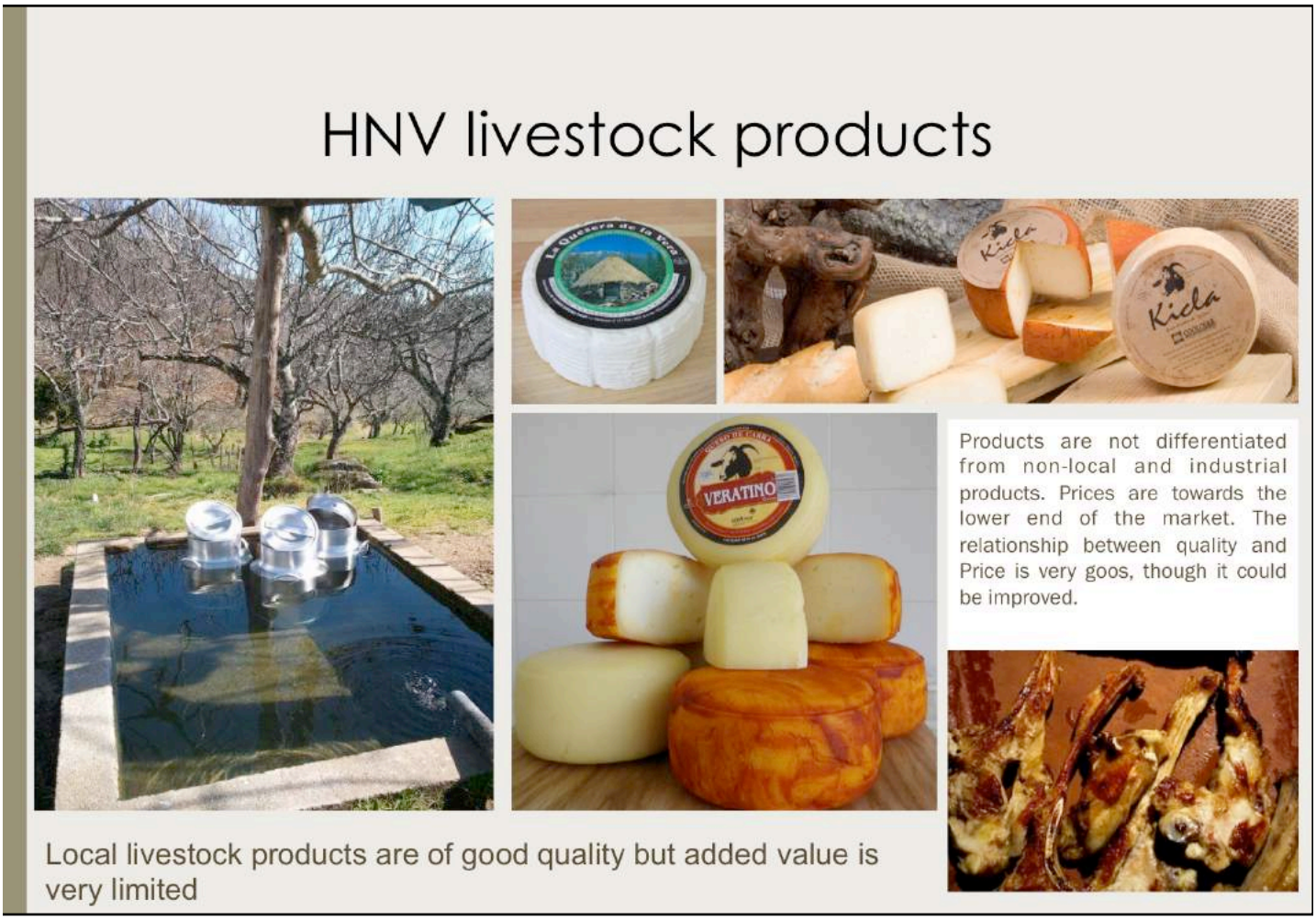
This is the basic results for the most common model of goat management.
These charts are being used to analyse the bahaviour of different practices in La Vera, to assess their performance and the impact they could suffer from policies and current trends.

Native breeds

The verata goat (and the "vellosa", another local breed that is not officially recognised), are replaced on many holdings by more productive but less hardy dairy breeds, less suited to the more extreme mountain grazing conditions. Grazing gradually declines as a dominant practice as housing of livestock becomes more common.
The most common bovine breed in the área is the Avileña-negra ibérica. It is the typical breed of the mountains of the Iberian central System, and very fond of the dehesa system.







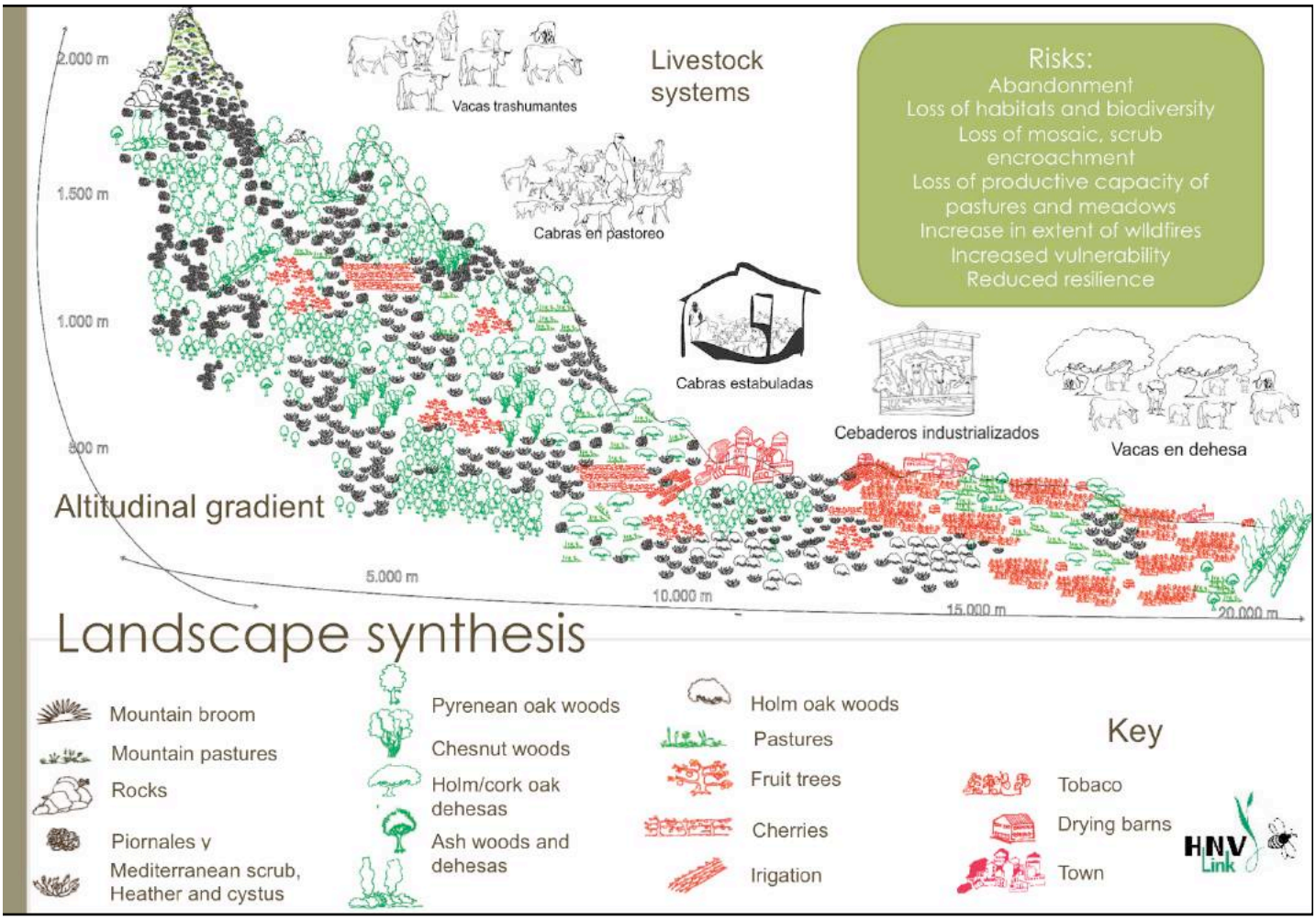
HNV livestock products

Cheese and kids (to a much lesser extent) are the main products of the HNV livestock system.
However, there are only 4 licensed cheese dairies in La Vera, and only one of these is linked to an individual goat farm (but also buys milk from other farms). There are no licensed artisan dairies, although many farmers produce artisan cheese for sale with no licence. There is no single goat farm doing licensed direct sales of milk or cheese in La Vera. This is extraordinary if we consider other similar parts of Europe, and also parts of Spain (the island of Gran Canaria has 150 artisan cheese dairies!).

Rather than adding value themselves, most farmers sell their milk to bulk buyers, whether the local cooperative COOLOSAR, or other buyers outside the region. The milk is processed into cheeses of reasonable quality, but not differentiated in the market as a special product from a natural grazing system. Prices are towards the lower end of the market. There is no PDO for La Vera cheese – this was proposed by COOLOSAR to the Regional Government but rejected by the latter.

The selling prices are low and farmers complain about them. Although the goat milk prices are higher and more stable tan cow or sheep milk they can't compensate the workload of grazing and manual milking, so buyers and cooperatives are pressing towards intensive production.

Lack of differentiation between pastoralis-based and extensive production is depleting prices of extensive kids meat, and grazing-based dairy production. In these conditions, pastoralist production is hardly profitable, and farmers rely only in their heritage (lands and facilities) to keep their business running, even under profitability.

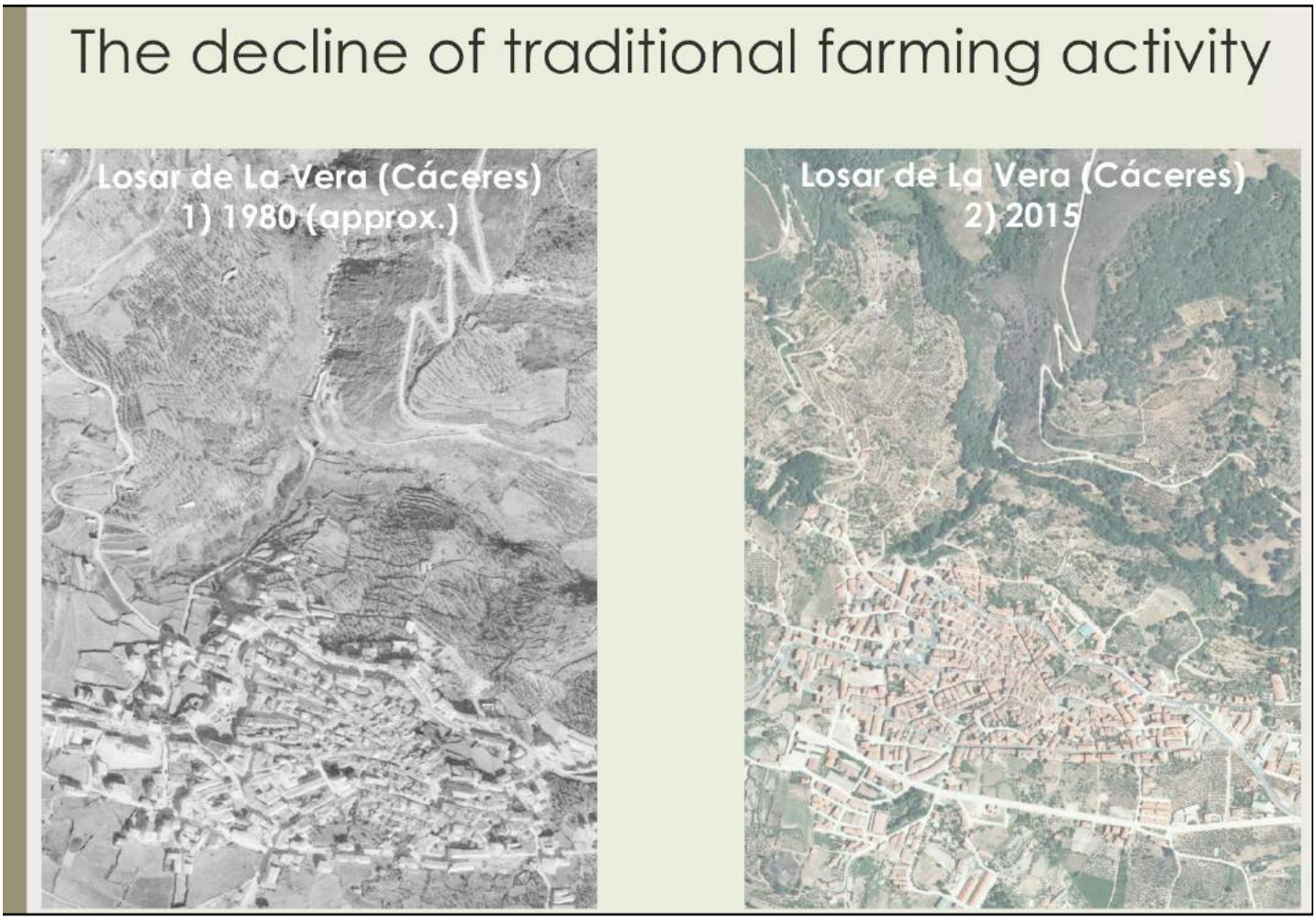


Transect of today's landscape

The transect runs from the peaks of La Covacha at almost 2.400m to the valley of the river Tiétar. It shows the main types of woodland vegetation (dominated by Pyrenean oak, but also with chesnut and, at lower altitudes, Holm and cork oak); the shrub communities (mountain broom at high altitudes, heathers and cystus in a widespread mosaic with aromatic plants such as lavendar); the pastures of Nardus and other herbaceous comunities and occasional surviving hay meadows. Tree crops are scattered at intermediate altitudes and irrigated tobacco and paprika peppers in the river valley.

Landscape changes

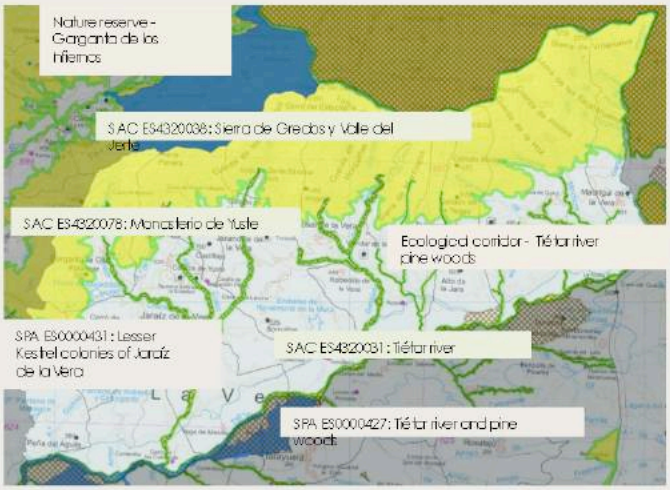
The expansion of irrigation in the Tiétar river valley saw the clearance of large areas of pine and oak forests in the lowlands and foothills. Remaining mountainous areas are protected in a Natura 2000 site.
Fire and grazing have marked the evolution of the landscape in La Vera, specially in the highlands. Until the 1970s much of the oak forests at low to mid altitudes were cleared by a combination of grazing and fire, the latter being used to regenerate pastures but also to clear land for cropping. The dense pyrennean oak sprouts were managed by clear cutting to provide fuel, livestock beds and small wood.
Clearing cuts and fire have been key factors in the evolution of the Pyrenean oak forests at mid altitudes. Although not affecting greatly their extent due to their high capacity for regeneration, mature trees are absent in some areas.

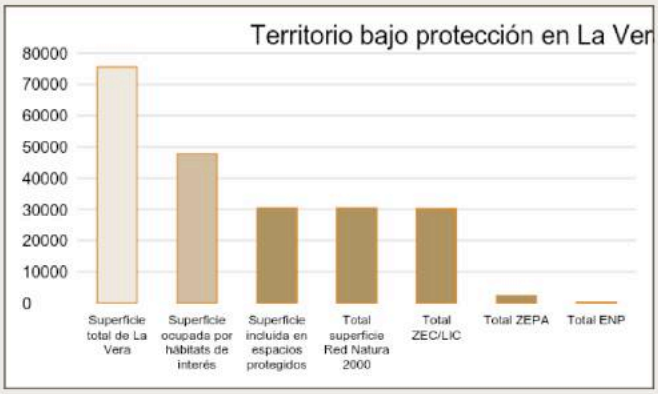


The decline of traditional farming activity

As grazing has declined over the past 30 years, and olives have been abandoned, the forest area has expanded. Where there is no grazing, regenerating Pyrenean oak creates a dense, impenetrable vegetation in some areas. Lack of use has also seen the steady loss of traditional paths, springs, stone walls, shepherds huts and barns. The landscape is littered with their abandoned remains.
At higher altitudes, juniper has begun to colonise the landscape, gradually moving down the mountain to the level of Pyrenean oaks.
Sheep have all but disappeared. Dairy cattle, previously common around villages, have also gone. Cattle are now kept for meat, especially at higher altitudes. They use mountain pastures in summer and move down to lower altitude dehesas (some are commons, some are private fenced pastures) for the winter.

Natura 2000 in La Vera





Natura 2000 in la Vera

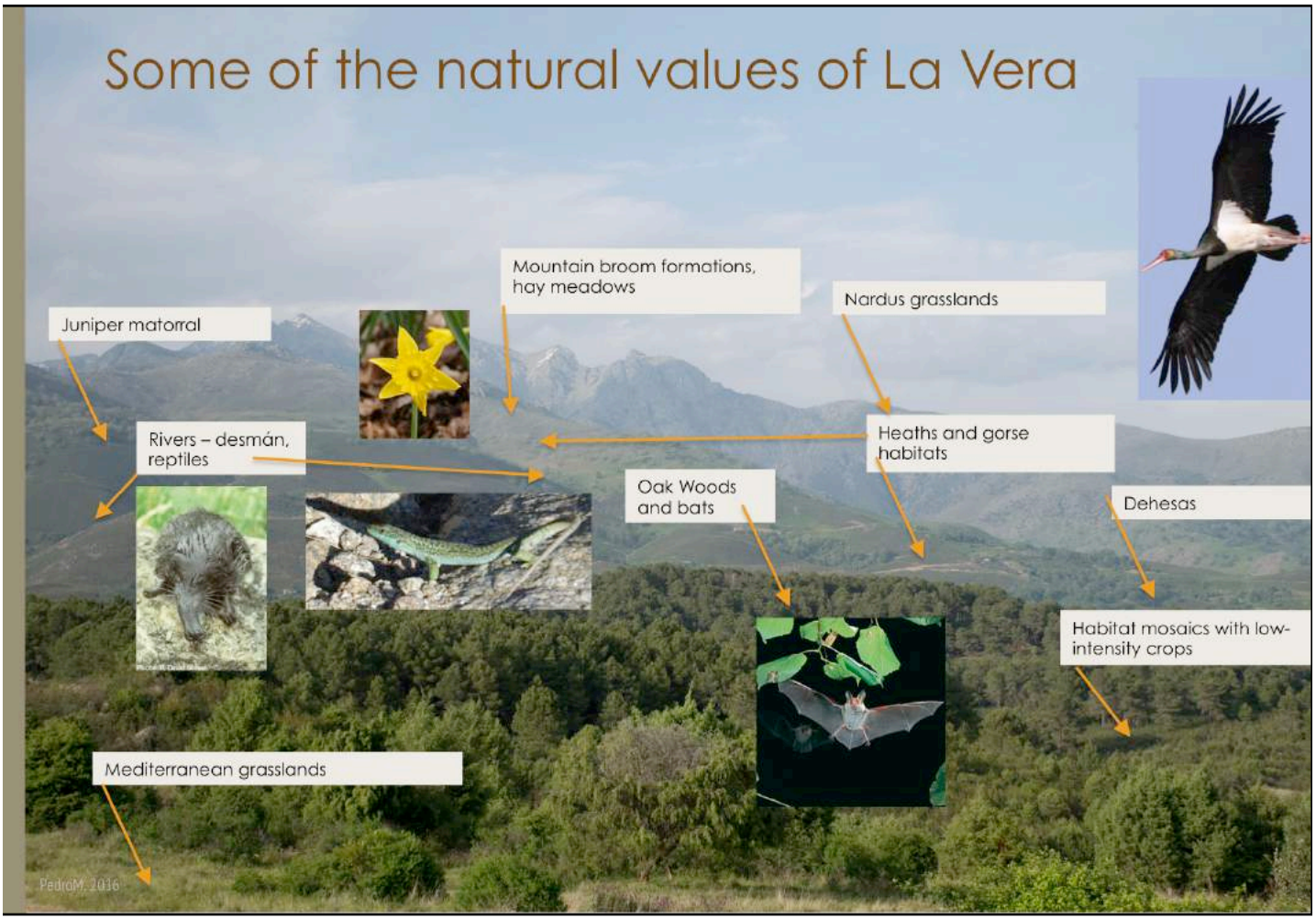
Tipo	Nombre	Superficie en La Vera	Superficie del espacio	Superficie fuera de La Vera	% en La Vera	CódigoSitio
ZEC/LIC	RIO TIETAR	2066,82371	4320,99113	2254,16742	47,83%	ES4320031
ZEC/LIC	SIERRA DE GREDOS Y VALLE DEL JERTE	28124,3839	69526,9273	41402,5434	40,45%	ES4320038
ZEC/LIC	MONASTERIO DE YUSTE	13,8098427	13,8098427	0	100,00%	ES4320078
ZEPA	RIO Y PINARES DEL TIETAR	2337,03539	8716,4708	6379,43541	26,81%	ES0000427
ZEPA	COLONIAS DE CERNICALO PRIMILLA JARAIZ DE LA VERA	33,1646806	33,1646806	0	100,00%	ES0000431

Several Natura 2000 sites covering a large area of HNV land

Natura 2000 in La Vera

Most of the mid-high altitude zone of the mountains in La Vera is designated as SAC ES4320038: Sierra de Gredos y Valle del Jerte. This site covers over 40,000 ha, of which 40% is within the district and includes a large part of the HNV farming system.

Other important Natura 2000 sites are the Tiétar river and several of its tributaries that come down from the mountains, thus connecting the upland SAC with the river SAC.



Selection of species for which the upland SAC is designated

Plants

Narcissus minor subsp asturiensis (Narcissus asturiensis)
Veronica micrantha
Isoetes velatum subsp. asturicense (Isoetes boryana)

Narcissus pseudonarcissus
Omphalodes brassicifolia
Veronica micrantha

Invertebrates

Lucanus cervus
Pyrgus sidae (BUTTERFLY DEPENDENT ON HAY MEADOWS, GREDOS HAS ONLY POPULATIONS IN SPAIN, BUT IT HAS NOT BEEN IDENTIFIED IN LA VERA)

Bats

Myotis bechsteinii
Rhinolophus euryale
Rhinolophus mehelyi
Nyctalus lasiopterus

Birds

Ciconia nigra
Aquila chrysaetos
Pernis apivorus
Lanius collurio
Luscinia svecica
Anthus campestris
Milvus milvus

Other vertebrates

Iberolacerta cyreni (Iberolacerta monticola)
Galemys pyrenaicus

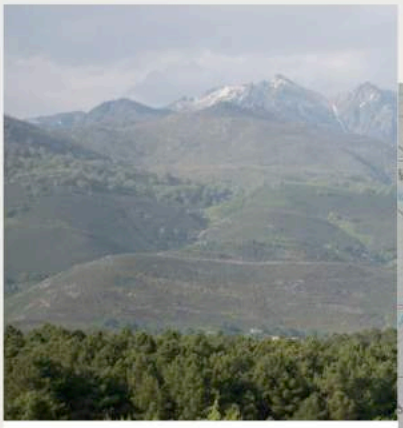
Selection of habitats associated with extensive livestock

Natura 2000 habitats	Extent in SAC (ha.)
4090 Oro-mediterranean heaths with gorse	19,782
9230 Oak woods of *Quercus robur* and *Q. pyrenaica*	17,335
4030 European dry heaths	15,131
5120 Mountain broom (*Cytisus purgans*) formations	13,501
6420 Mediterranean tall humid grasslands of the *Molinio-Holoschoenion*	2,848
*6230 Species-rich Nardus grasslands	2,051
5210 Arborescent matorral with *Juniperus* spp.	1,732
6160 Oro-Iberian *Festuca indigesta* grasslands	1,496
6310 Dehesas with evergreen *Quercus* spp.	917
6510 Lowland mountain hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)	0.5

The SAC includes numerous habitats that are intimately associated with the HNV livestock system. Several of these habitats cover large areas (thousands of hectares), while others are more restricted in area (e.g. Nardus grasslands, hay meadows).

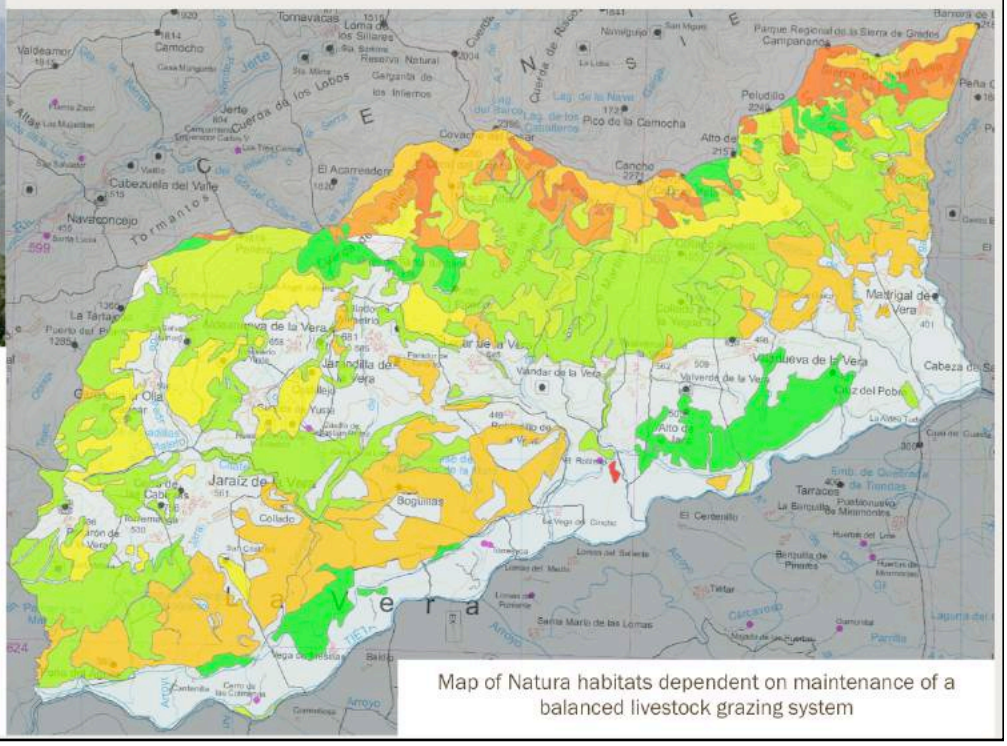
The conservation status of these habitats depends directly on the continuation of extensive livestock raising, with a balanced and sustainable use of the pastoral resource.

Association between extensive livestock and natural values of La Vera



The HNV system – summary of environmental benefits

1. High landscape diversity and biodiversity
2. Accessible landscape (tourism value)
3. Territorial heterogeneity, combined with continuity
4. Maintenance of Annex 1 habitats
5. Scrub control
6. Fire prevention
7. Maintenance of landscape features (e.g. watering points)



Map of Natura habitats dependent on maintenance of a balanced livestock grazing system

Pyrenean oak forest is the most widespread habitat, covering about 20,000 hectares

SAC Management Plan objectives for oak forest:

- Maintain an optimum grazing pressure (livestock and wild fauna) that avoids over-grazing while also preventing excessive development of scrub.

The Plan has no mechanisms for promoting this objective;

There are no RDP measures implemented for this purpose.

Annex 1 Hay meadows officially cover only 0.5 hectares, but there are more, and in severe decline

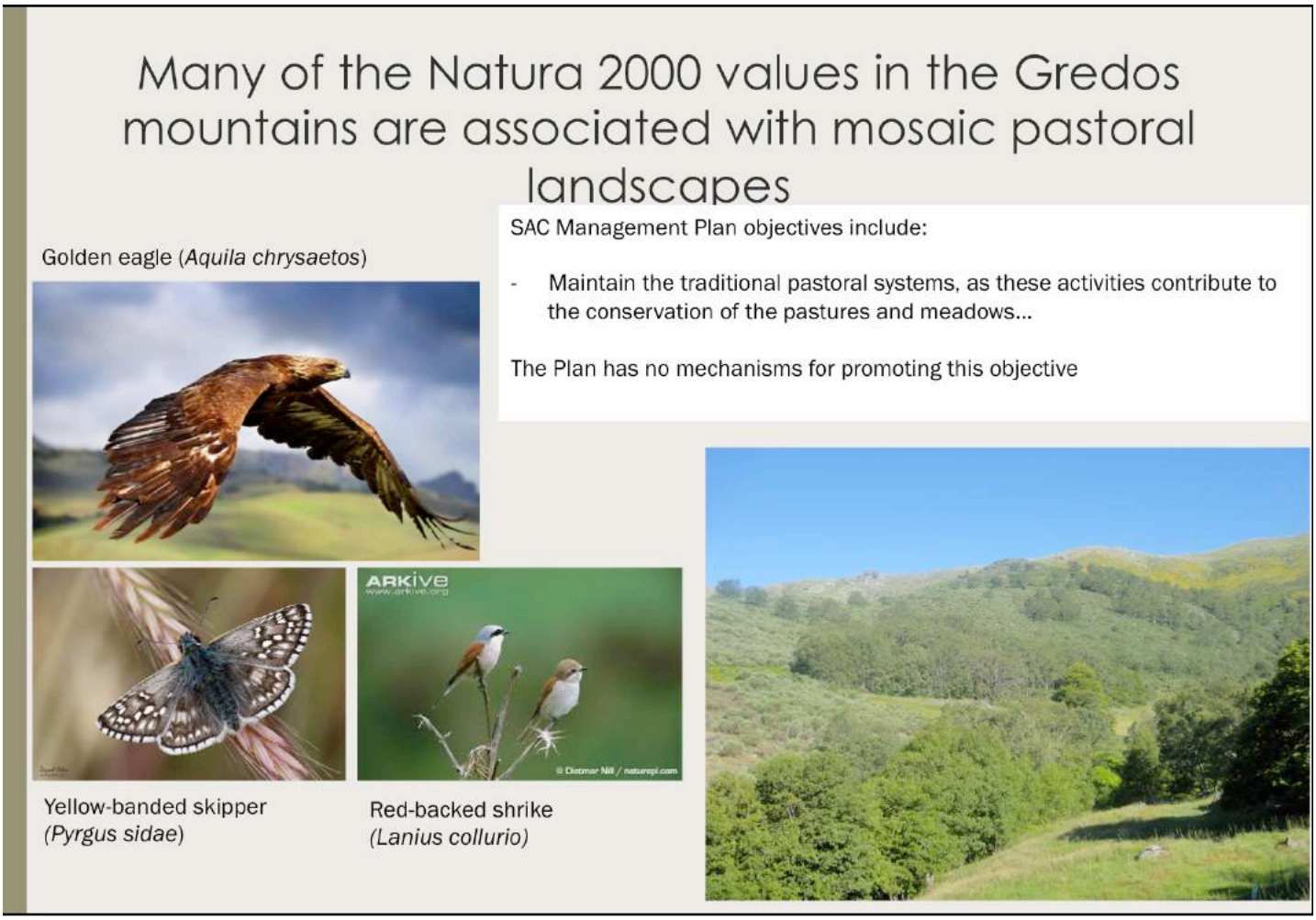
The semi-abandoned meadow on the right is being monitored by EFNCP under a butterfly monitoring Project – 60 species have been identified

SAC Management Plan objectives include:

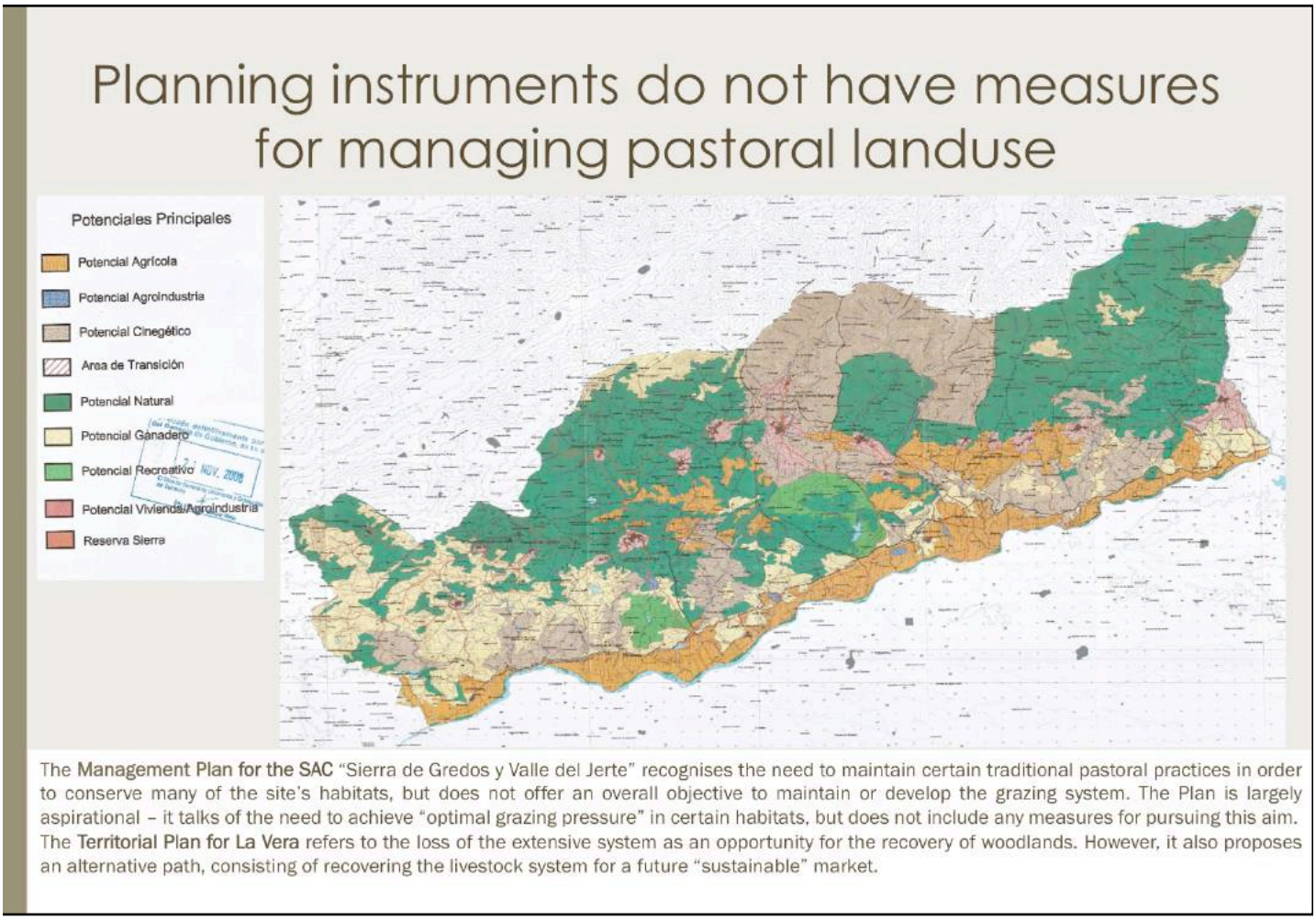
On hay meadows that are no longer cut for hay, to maintain a sufficient grazing pressure to avoid scrub encroachment.

The Plan has no mechanisms for promoting this objective, and no RDP measures have been implemented with this objective.

Hay meadows were not well inventoried when the site was designated (only 0.5ha, when in reality there are a lot more). Since designation there has been no conservation action, and many of these habitats have been abandoned, or in some cases intensified, thus contravening the habitats Directive.



In practice, the Habitats Directive requirements to maintain habitats and species in a favourable conservation status are not being met. The conservation actions of the regional authorities are focused on very specific habitats in small locations, notably stands of yew and holly. There is no action to influence management of the large-scale Annex 1 habitats or the wider habitat mosaic.



Management planning instruments

There are several relevant planning instruments that influence land management and socio-economic development in La Vera, but overall there is no clear vision for pastures and grazing, and the key instruments are poorly developed:

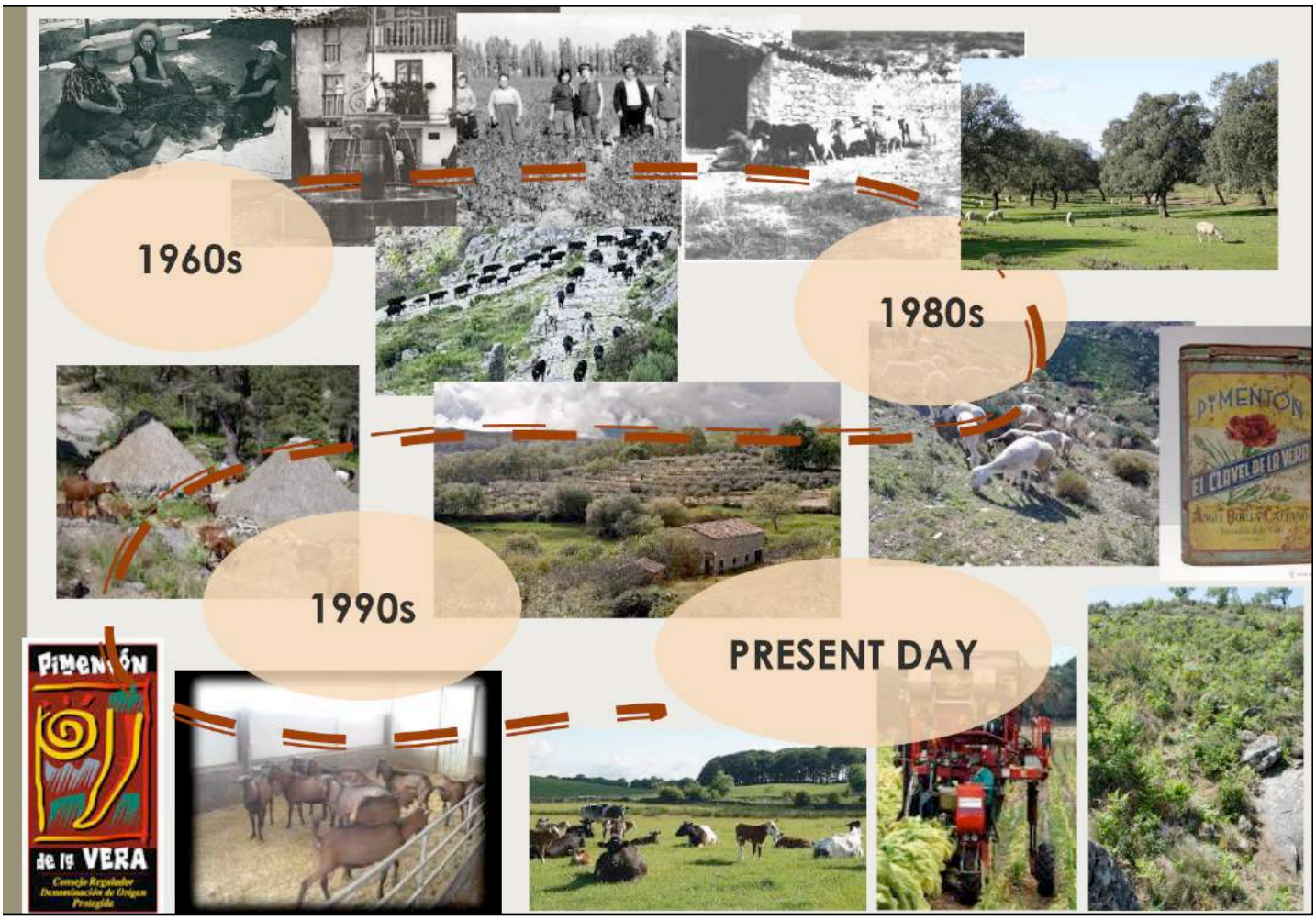
- Territorial Plan for La Vera which regulates land-use planning within the framework of the regional legislation. Not well adapted to the development of small-scale infrastructures for farming and processing on rural land, as these are treated as "industrial" developments.

- Rural Development Strategy, produced recently by the LAG through a rather weak participatory process, which sets priorities for LAG funding in the current RDP period. This gives more attention to the crop sector than to livestock, and provides no future vision for the grazing systems of the district. It does include a line of action to support small-scale processing and value-added in the primary sector.

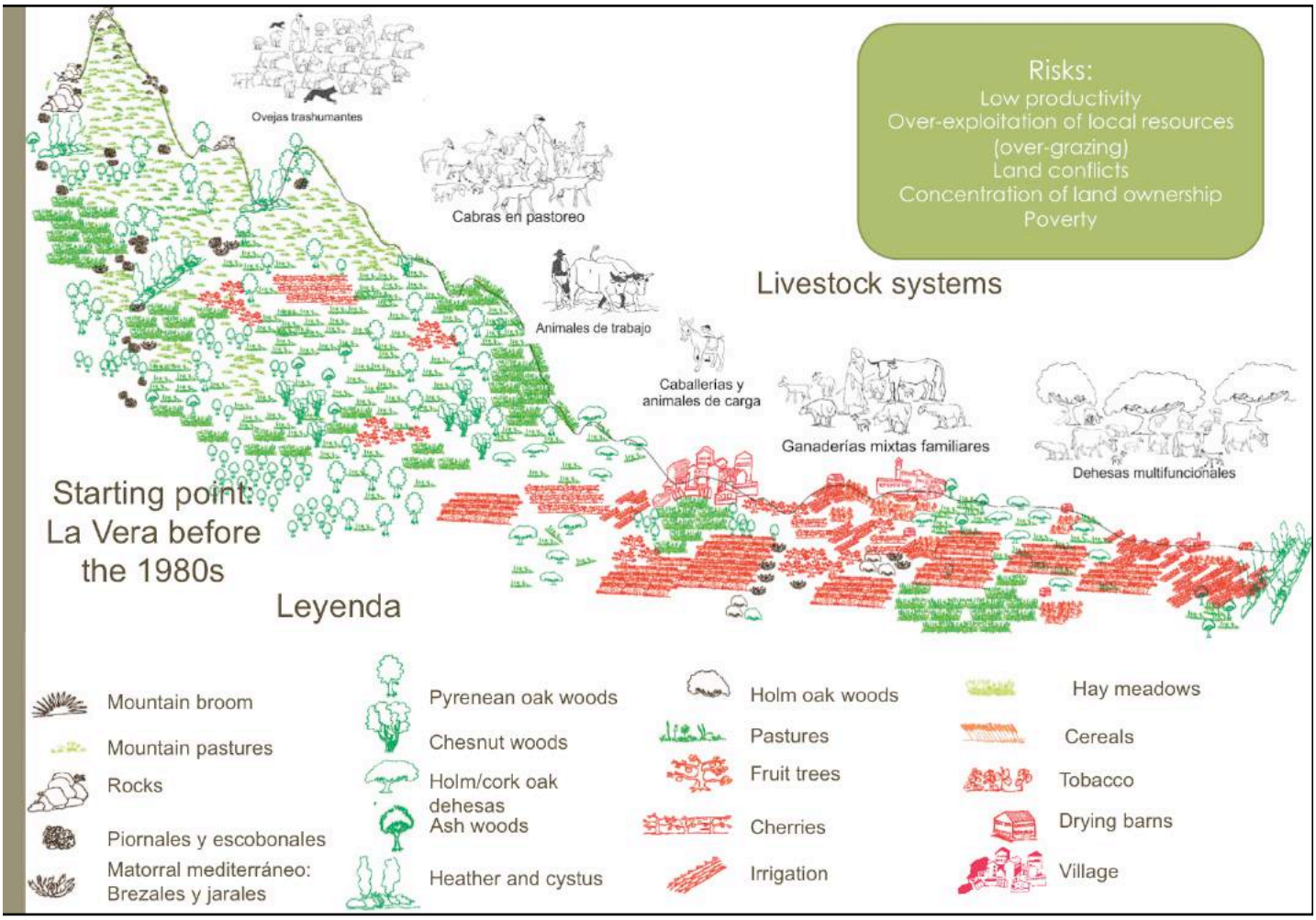
- SAC management plan, as referred to above this includes some notable objectives for maintaining a balanced grazing system, but there are no measures for achieving this (the key RDP options have not been implemented for this purpose), so they are merely wishful thinking.

- Management plans for Montes Públicos, critical planning instruments that include forestry and pasture management, but only one of the 31 montes has a plan and, although very detailed, it does not give clear objectives for pastures and grazing in the monte in question.

- Grazing plans for Montes Públicos (pliegos de pastos), these are very basic documents that set out the grazing resource in each municipality, the numbers of stock that can use them and the amount farmers must pay, while defining certain conditions (such as not damaging forest regeneration). Most are "cut and pasted" from previous



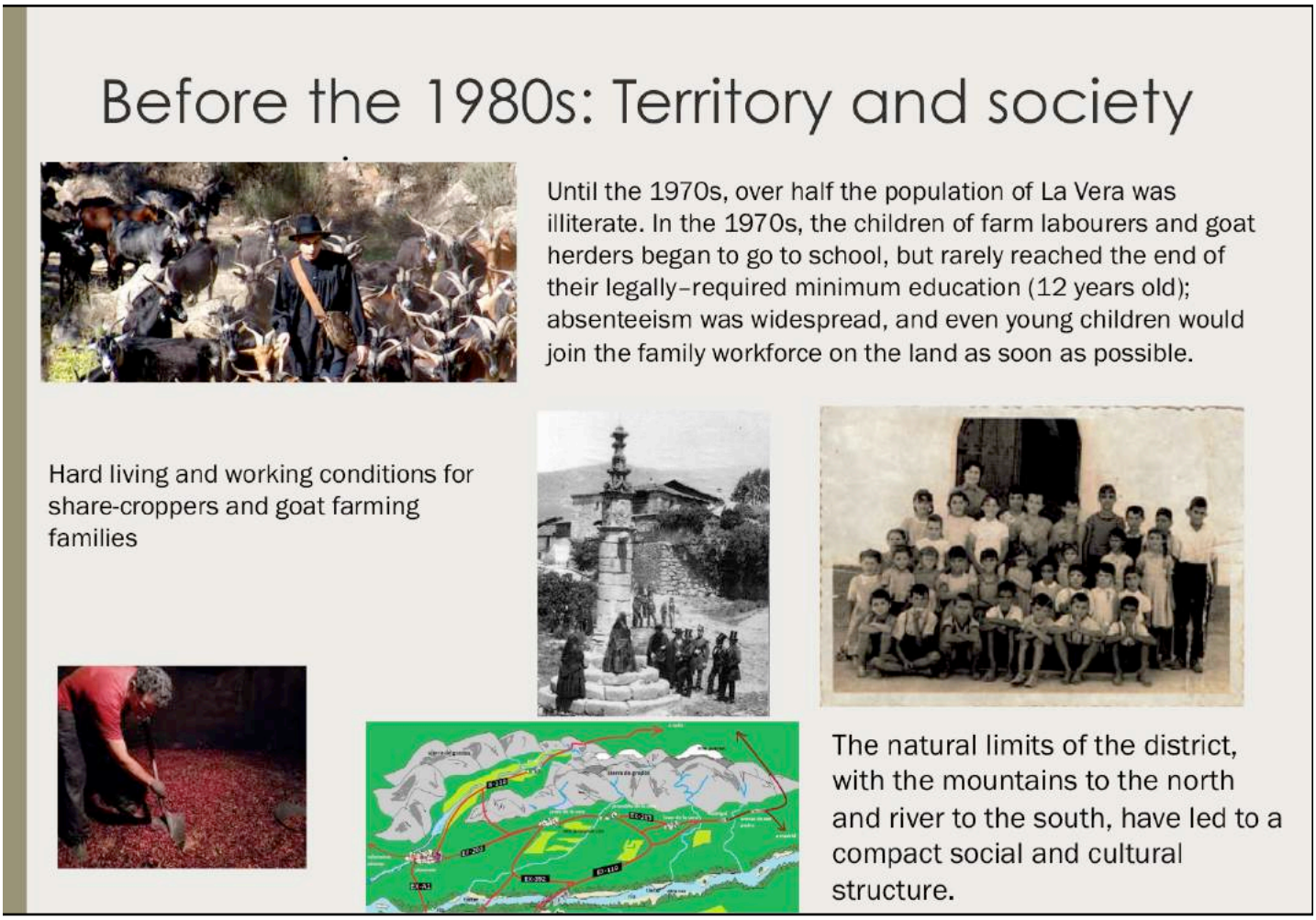
Time-line
Follow the dotted line from top-left.
Photos from on-line sources.



The starting point in the late 1970s

The transect illustrates the situation in the late 1970s and early 1980s. Compared with today, very large areas of grassland, scrub and forest are under grazing use, or cut for hay and other forms of forage. The range of livestock types is more diverse. Forests are mainly limited to the steeper slopes, and are exploited for firewood, forage and livestock bedding, as well as goat browsing. Dung is transferred to crops and subsistence vegetable growing. In the river valley, there are already large expanses of irrigated land. The municipal dehesas have mixed livestock and are used for grazing, pannage, firewood and charcoal, as well as some cropping.

In places there was undoubtedly excessive livestock pressure; for example, riverine woodlands were almost non-existent due to the practice of herding goats along river margins especially in the summer.

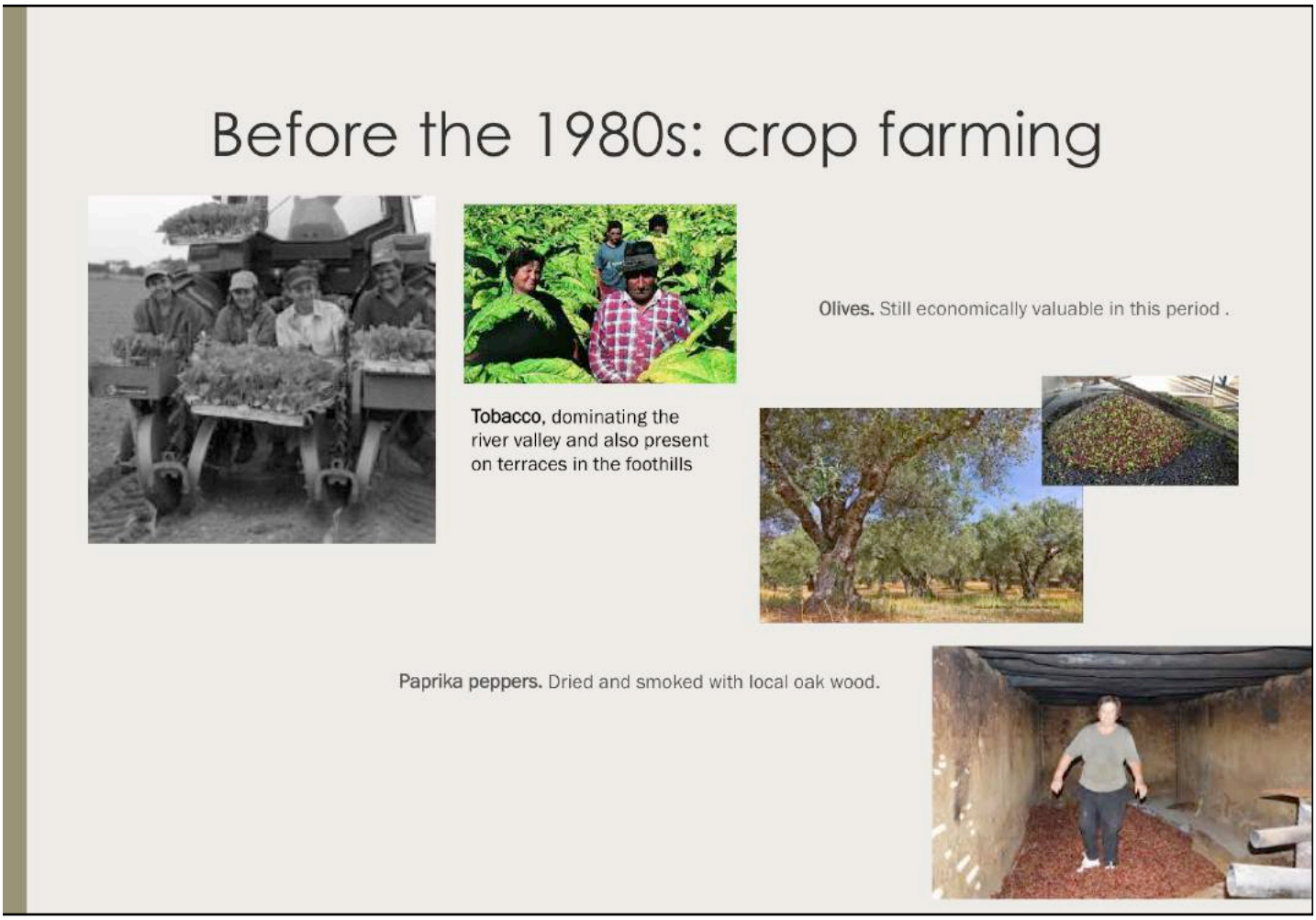


Territory and society before the 1980s

Society was very rural in character and based on the primary sector. The structure of land ownership produced enormous social differences. The wealthiest estates, in the irrigated river valley, were owned by well-off families who applied a system of *mediería* or share-cropping. Basically this meant that a share-cropper (mediero) and his family would live on the estate and do the farming and pay all the farming costs, in return for half of the production. The landowner made the decisions and kept half of the production for himself. These estates produced tobacco and paprika peppers.

In economic terms, the livestock sector was less significant than the crop sector. However, livestock were everywhere and many families kept a few head of sheep and goats, in particular. These were often kept together in a "village flock", and the shepherding was shared on a rota system. Goat farmers (or rather goat-farming families, as all members were involved) were the most common livestock farmers, and their place on the social scale was very near the bottom, similar to that of the medieros. Many goat farmers were illiterate and children often did not go to school. These families usually lived in the uplands in very hard conditions.

Map source: Jaramanda.com. Photos: from on-line sources



Crop farming before the 1980s

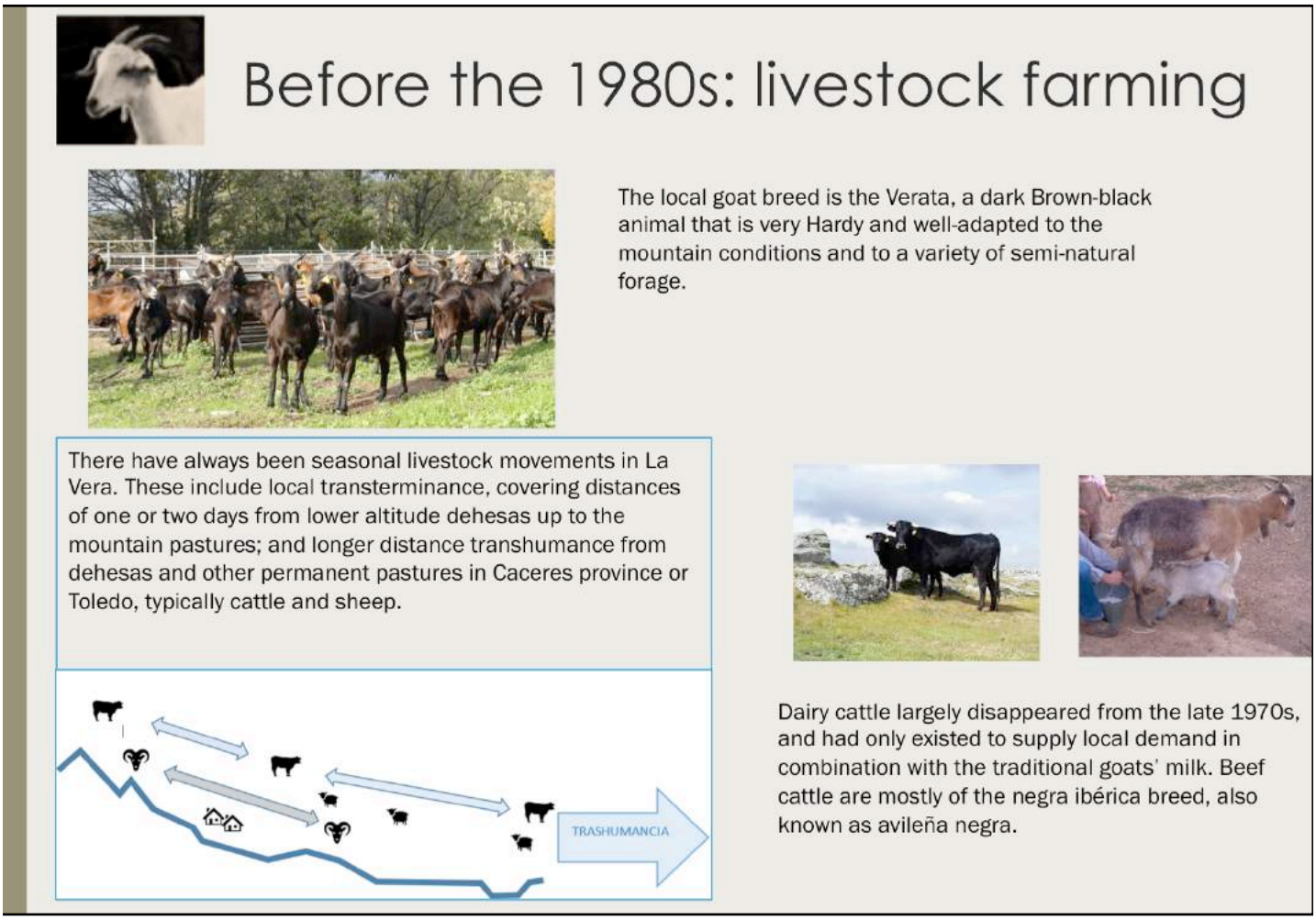
In the mid-20th century, the building of Rosarito reservoir on the Tiétar river led to the development of modern irrigated cropping on the floodplain, mainly for tobacco and paprika peppers, which became the economically dominant activities in La Vera from this time.

The foothills were covered with olive groves, farmed by hand and with animal traction, although from the 1970s the falling olive price led to some clearances of olives, in some cases to plant tobacco on the hillside terraces. The old oil mills began to close down.
Orchards (olives, figs, chestnuts) and vegetable gardens were mainly a family activity, but from the late 1970s the commercial cultivation of new crops began in La Vera (raspberries, kiwis and especially in the western municipalities an increasing area of cherry trees).

Tobacco was the main economic force in this period, being controlled by the State and protected from foreign competition, and subsequently massively subsidized by the CAP (from 1986). Production was all purchased by the State company at fixed prices, and quotas were allocated to producers.

Paprika peppers has been a traditional crop in the area for hundreds of years, and was one of the main exports from La Vera, as well as being a key ingredient in local preserved meat products and cooking.

Photos: author and on-line sources



Livestock

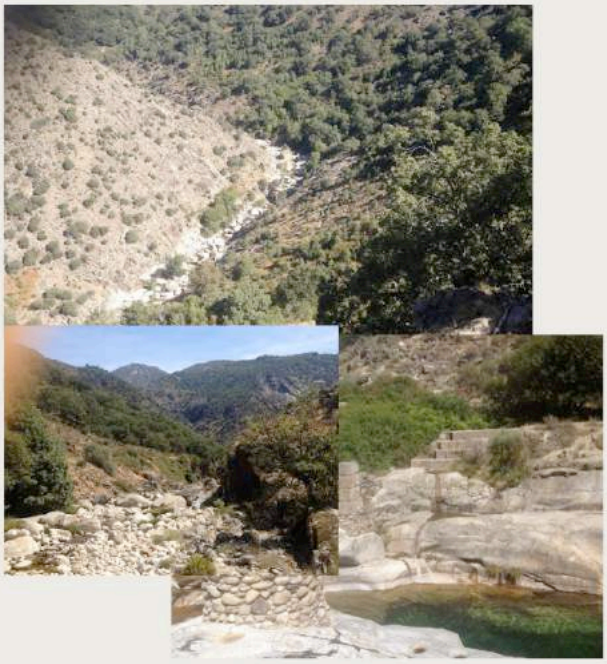
Before the 1980s, all livestock were in family farms and feed was almost entirely from semi-natural forage. Dairy cattle were kept near to the villages, and there were very large numbers of sheep and goats on the pastures and in woodlands.

Goats were generally kept at mid-high altitudes (above 1,000m) and the farming families lived there in very rudimentary conditions, with no electricity or running water. Cheese was made at the farm in the mountains, and transported to the village for sale by mule or donkey, constituting a crucial cash income for the goat farming family.
Cattle farmers were generally based in the villages, moving their animals to different pastures according to the season.

Seasonal movements take different forms. Many families move from the foothills to the uplands in the summer months with all of their livestock, including chickens and pigs. There are also longer distance movements (transhumance) of large flocks of sheep and herds of beef cattle.

Photo sources: author and on-line

Before the 1980s: landscape and biodiversity



Oak woodlands were more open and with no understoey, due to heavy grazing pressure and use of foliage as forage and prunings and trees for firewood.

The mountain rivers are an essential and defining characteristic of the landscape of La Vera. Before the 1980s, riverine vegetation was heavily grazed by livestock, epsecially goats and sheep. Riverine woodlands of alder and ash have recovered in recent decades.

Local people talk of a countryside very rich in wildlife, more so than in the present day, despite the relatively intensive exploitation of resources. This is probably due to the high diversity of largely semi-natural habitats, as well as the range of altitudes.

Photo source: Author's own

1980-1995: PERIOD OF POLITICAL AND SOCIAL TRANSITION

Fotografías procedentes de fuentes online

1980-95: new developments in crops…

The turkish style tobacco varieties (*Burley*), begins to be replaced by *Virginia*, requiring drying in gas ovens rather than the old air-drying system. This leads to a massive reconversion of the sector and investment in new drying machinery. Cultivation and harvesting also begin to be mechanised. Immigrant labour especially from the maghreb is increasingly a characteristic. State controlled prices are replaced by CAP support.

Cherry cropping expands considerably, especially in the western uplands of the district, coming within the PDO for Cherries from Valle del Jerte. Oak woodlands are cleared for cherry plantations. Polytunnels, mainly for raspberries, expand with CAP funds channelled through the cooperatives. Cherries and raspberries become important export crops.

The PDO for Paprika of La Vera is established in 1991

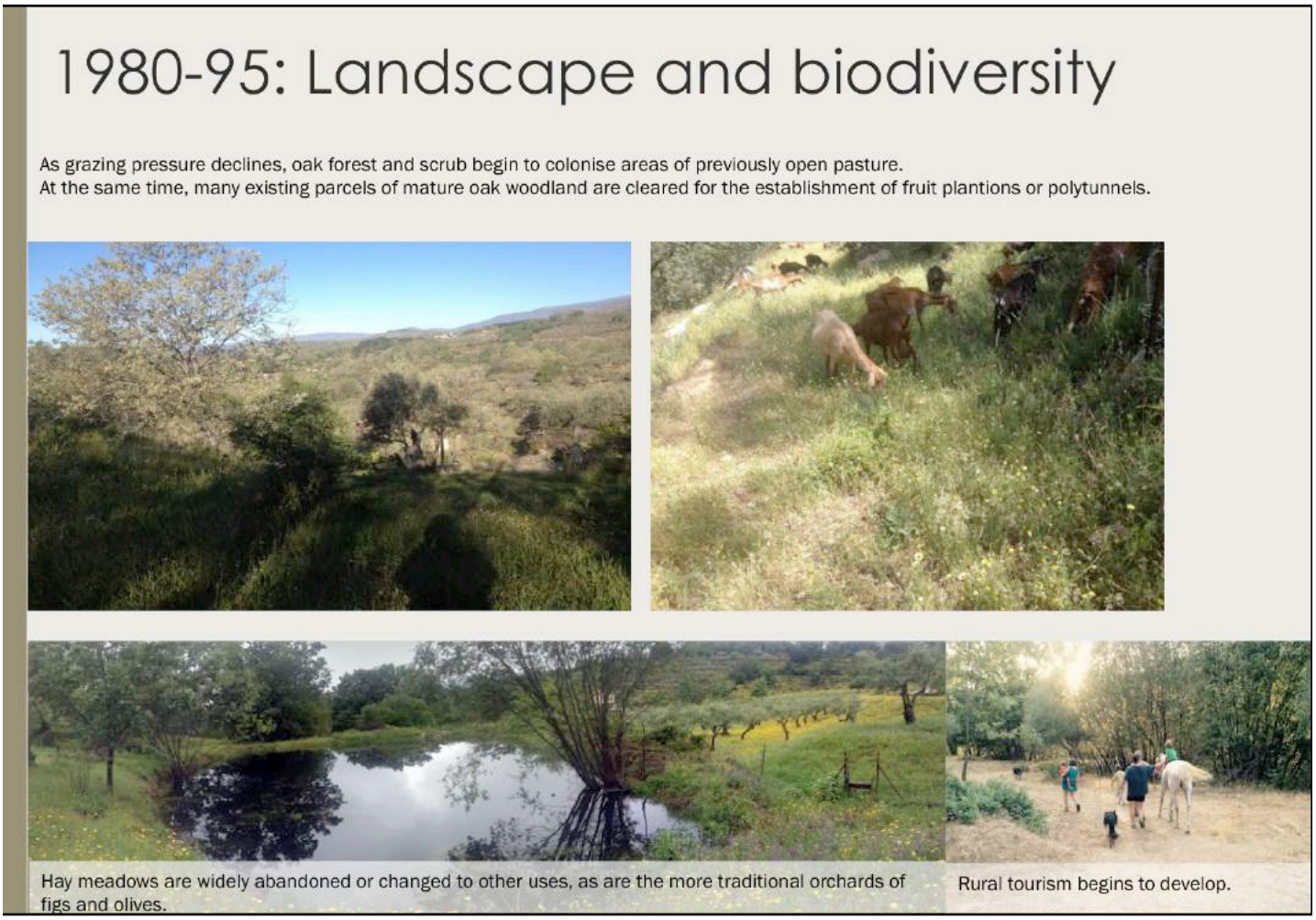
Tobacco becomes an increasingly dominant sector economically. In 1987, following EEC accession, a new State company CETARSA is established to manage the buying and processing of the product. Faced with uncertainty and fearing liberalization, many tobacco landowners sell their land, often to the share-croppers, who suddenly become independent farmers in receipt of massive CAP subsidies, and with considerable influence on the regional government's approach to the CAP (on-going and successful defense of the tobacco subsidy in the face of pressure from Brussels).

Photos: from on-line sources.

Less development for Livestock

While crop farming is undergoing major development and investment, with accompanying social change, livestock farming is largely stuck in the past, with the traditional labour demands of shepherding and hand-milking. But the traditional making and selling of cheese is rapidly wiped out, or driven underground, by rigidly applied EEC food hygiene rules. This removes a key source of income and forces farmers to sell their milk, with major problems for transport and collection in the mountains

Although the share-cropping system passes into history in this period, allowing tobacco-growers to increase in social stature, the goat Farmer continues to be seen as at the bottom, of the social order in La Vera. Cattle farmers have more social and economic stature, and usually control the rights to pastures, sub-letting them to goat farmers.



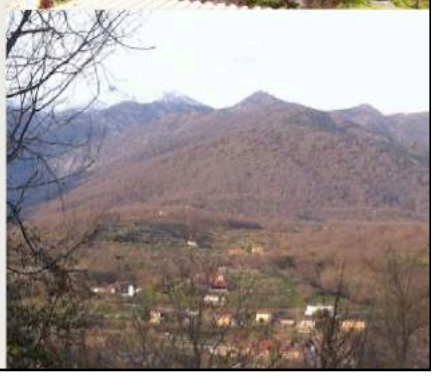
As grazing pressure declines, oak forest and scrub begin to colonise areas of previously open pasture. At the same time, many existing parcels of mature oak woodland are cleared for the establishment of fruit planations or polytunnels. Environmental protection legislation is introduced to control changes of land-use, such as establishment of new fruit plantations at the expense of natural vegetation. The controls cause bad feeling from local population, and are not always respected.

Rural tourism begins to develop, mainly focused on the mountain rivers. There is no real agri-tourism and only limited development of walking trails. The landscape is a backdrop for tourism, but the two things are not integrated.

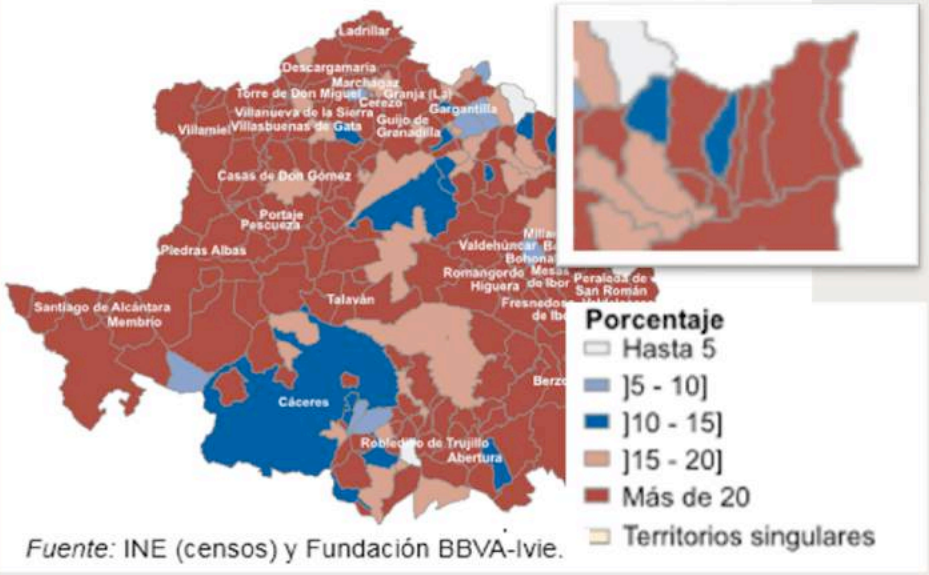
Hay meadows are widely abandoned or changed to other uses, as are the more traditional orchards of figs and olives. Herbicide rapidly becomes the standard way to remove herbaceous cover in orchards, thus reducing biodiversity and soil protection.

The higher moutains experience rapid colonisation with broom and cystus as livestock numbers decline. Hunting of Spanish Ibex and other large fauna becomes an increaingly important land use at higher altitudes.

1995 to the present

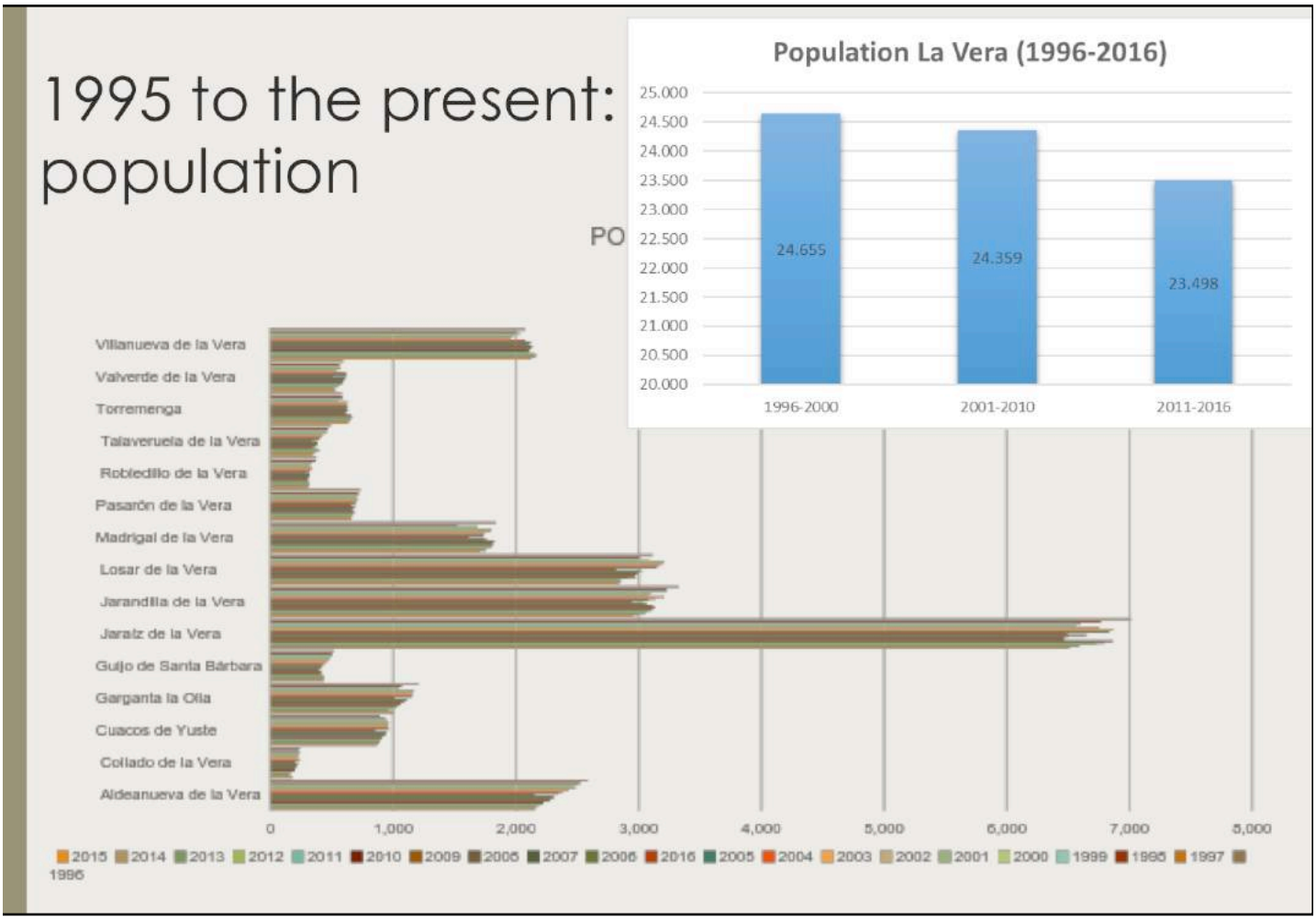


Map showing the rate of illiterate people in the late eigthies



Fuente: INE (censos) y Fundación BBVA-Ivie.

Photo source: Author's own
Map source: BBVA-Ivie



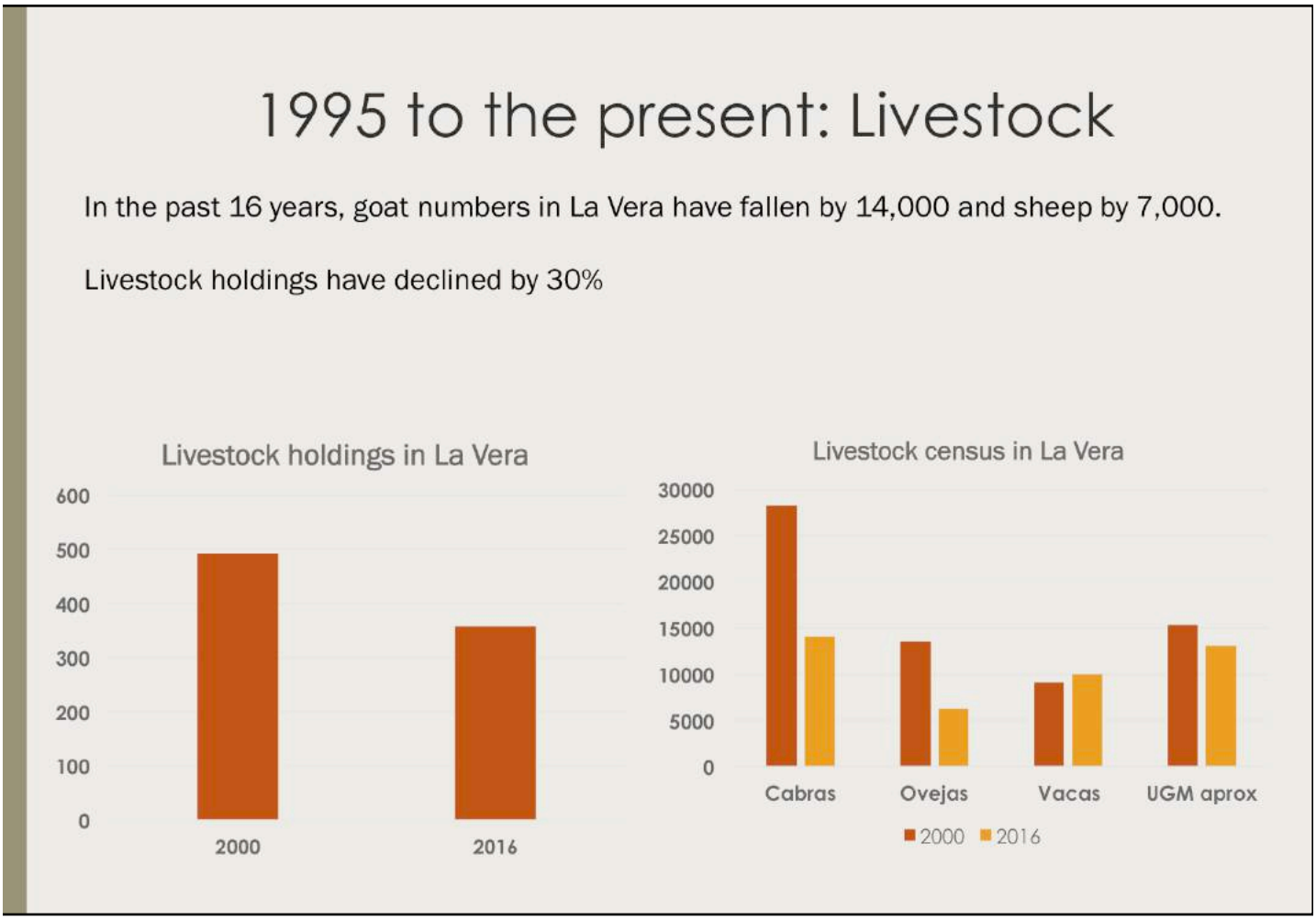
Social change

The influx of newcomers that started as a minor phenomenon in the 1980s, increases in this period. The relative accessibility of plots of land for house building (with or without a licence) and the attractive landscape and climate attract incomers of all ages from different parts of Spain and abroad. More recently, there has been a wave of young “neorural” people often with an agro-ecological agenda, experimenting with the creation of a new rural economy.

At the same time, some emigrants from La Vera return to their native village, while many young people leave the district in search of higher education and employment elsewhere in Spain and the wider world.

Overall, society in La Vera has changed from a very traditional, class-ridden and inward-looking society to a relatively modern, diverse and culturally rich society with global connections.

Graph. Based on data from INE



Since the turn of the century, the decline of sheep and goats seems to have accelerated. Although goat grazing continues on a smaller scale, there is a continued tendency towards semi-indoor systems in the foothills near to the towns. Mid-altitude grazings are abandoned in many areas, as stock numbers are insufficient to use the entire forage resource.

Cattle numbers have increased slightly, reflecting the better economic situation, higher CAP support and lower labour requirements of beef cattle. The traditional system of winter grazing in the dehesas and summer grazing at high altitudes is maintained by most cattle farmers.

Traditional infrastructure, such as tracks, watering points and huts, has partly disappeared. Goat farmers still have quite rudimentary facilities. Although in some cases considerably improved since the 1980s, with new sheds for example, around half of farmers still rely on hand milking, which is very time-consuming.
The great majority of goat farmers are over 50, many are older, and successors are extremely rare. The normal pattern when a Farmer retires is that the Flock is sold outside the district.

The role of the CAP from 1986

The CAP begins to be implemented in Spain from 1986. It is characterised by high levels of price support for tobacco in particular, and far less support for sheep and goats.

Traditional tree crops such as olives and figs are supported to some extent by minimum prices that help to provide an incentive for continued production.

Newly developing crops in La Vera such as cherries and raspberries have very little Pillar 1 CAP support, but funding is received by the powerful cooperatives from structural funds and later from Pillar 2, including grants for investments by members in new plantations and polytunnels.

CAP in transition – changing instruments but the same imbalances

As the CAP transitions away from price support towards area payments for crops and headage payments for livestock, the historic imbalances are maintained.

Tobacco growing is rewarded with an enormous payment that reaches as much as 10,000 euros per hectare, for producers that hold historic quotas.

Figs lose their minimum floor price and these traditional orchards are increasingly abandoned as prices drop below the point of economic viability.

Olives lose the tree payment for small producers, and the transition to decoupled payments rewards producers who had high yields in the 3 reference years.

Sheep and goats find themselves with a headage payment far smaller per LU than that received by beef cattle producers.

The "new" CAP from 2014 – things get even worse or pastoral farming

New eligibility rules for permanent pastures lead to the exclusion from all CAP support of very large areas of grazed habitats (see next slide).

Headage payments for goats/sheep are around 7/8 euros, compared with 15/20 euros in France and Bulgaria, as a result of national decisions.

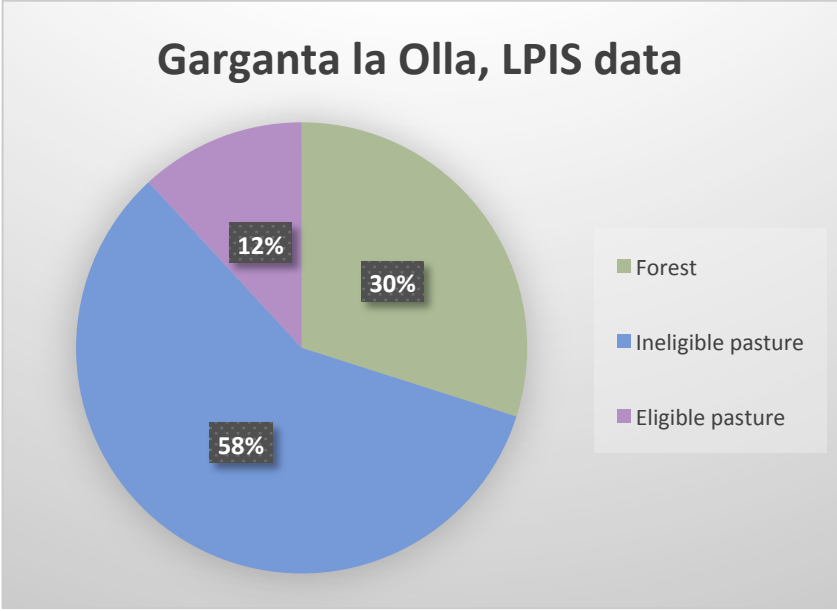
Under a new system of "regionalised" Pillar 1 payments, the irrigated arable land of Jaraíz de La Vera (tobacco land) has the highest payment per hectare in Spain (1,430 euros). In nearby Toledo, similar irrigated land has a payment of 274 euros. Permanent pasture, if it is eligible, gets around 50 euros.

Agri-environment scheme for tobacco (integrated production) has a payment of 800 euros per ha. For extensive livestock the agri-environment scheme pays 119 euros per ha, but most of the grazing land in La Vera is excluded from agri-environment by the Pillar 1 eligibility rules, also applied to Pillar 2 in Spain.

Vast areas of permanent pasture have been made ineligible for the CAP (including agri-environment) under the post-2014 policy.

In one municipality (Garganta la Olla) only 12% of the total pasture and forest area is eligible.

Pasture and forest are both used for grazing, although there is no accurate record of the actual use of each parcel.



Food hygiene rules and the decline in traditional cheese-making

From 1986:

- Spain joins the European Community and begins to implement strict food hygiene rules
- Traditional on-farm cheese-making in the mountains is outlawed
- Abandonment of milking in the mountains is driven by:
  - Lack of access for daily transport of milk
  - Lack of electricity for cooling milk and pasteurising milk from flocks with brucelosis
  - Prohibition on traditional methods for managing temperatures in dairies

Rigid application of food hygiene rules has been one of the main drivers of the decline of the extensive HNV grazing system in La Vera, as producers lost a crucial cash income from making cheese and thus adding value to their milk. An alternative strategy could have been to adapt the rules to the circumstances of small-scale artisan systems, while investing EU funds in an appropriate modernisation programme for these systems, rather than full-scale industrialisation of cheese making.

An attempt to establish micro cheese dairies in conjunction with the main co-operative (Coolosar) fell foul of the hygiene rules, and they had to close.

Thus in a few years (late 1980s to 1990s) the system went from one in which practically all goat farmers made and sold their own cheese, to one in which there is no licensed on-farm cheese making, and the great majority of milk is sold to the co-operative or other buyers outside the district.

Food hygiene rules and the decline in traditional cheese-making

- 1990s:
  - The co-operative Coolosar establishes micro cheese dairies in the mountains for making cheese (Kikla Brand) to be matured at the co-operative.
  - As these micro-dairies are forced to close, Coolosar sets up its own centralised cheese dairy in 2000
  - No more than 10 cheese dairies in the whole district of La Vera
- 2004:
  - Closure of last *mountain* cheese dairy in La Vera (all remaining La Vera dairies are in the foothills)

Present day situation of cheese making

- Semi-industrial cheese dairies: 3 of which 1 is Coolosar
- Coolosar has 20 livestock members supplying milk and buys milk from a further 20 farmers approx. (there are 350 livestock holdings in La Vera, probably no more tan half of them have goats):
  - *In 2000: 2m litres per year*
  - *In 2017: 1m litres per year (massive decline from 2009)*
- Farmhouse cheese dairies: 0 (but several exist without licence)
- Farmhouse cheese dairies in similar regions (la Vera 883 km^2/14000 goats):
  - *La Palma (Canarias): 888 km^2/7000 goats = 79 dairies*
  - *Valle del Vesubio (France): 393 km^2 = 13 dairies*
- Plans for new cheese dairies:
  - *HNV LINK has identified 8 projects (probably more to come)*
  - *They will only be possible with flexibility from authorities in the interpretation of food hygiene rules; and training and advice on developing this sort of project (very innovative for this region)*

Decline of local slaughterhouses and goat meat

- Slaughterhouses :
  - 1995: 8 municipal and 1 private
  - 2000: 2 municipal and 1 private
  - 2017: 1 private (in Jarandilla)
  - Most farmers use public slaugtherhouses out of the disctrict
- Local goat meat is not strongly promoted in local shops and restaurants
- Absence of initiatives to promote and differentiate La Vera goat meat from pastoral systems, from other more intensively farmed meat

Scrub encroachment and homogenisation of the landscape continue as grazing is reduced. In some municipalities there are now very large areas of dense, impenetrable oak regrowth of about 10-15 years old. In the Eastern parts, juniper formations have recovered and expanded as grazing declines.

Tourist pressure on the mountain rivers (several of which are designated SAC) has become extreme in places. Water extraction for irrigation of fruit crops also has considerable impacts on these rivers and their tributaries.

Much of the traditional mosaic of orchards has been lost and replaced by expanding oak forest and more intensive fruit cropping. Traditional orchards that remain have lost much of their biodiversity as a result of intensive use of herbicides to eliminate the understorey.

The intricate network of stonewalls and terraces that characterises the foothills is gradually becoming degraded as walls collapse and often are left, allowing the terrace to gradually erode. The government has not implemented agri-environment measures for restoring these landscape features.

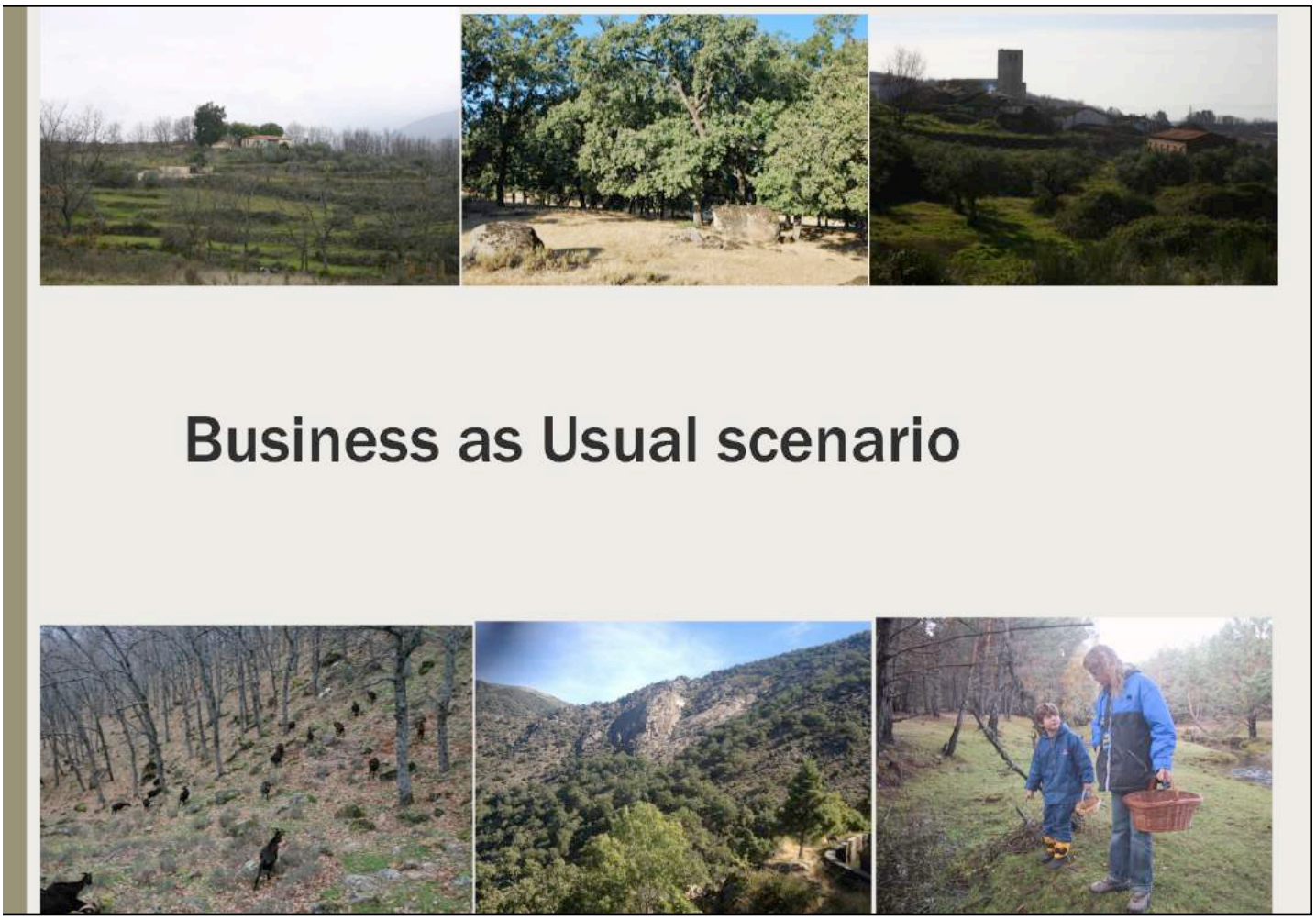
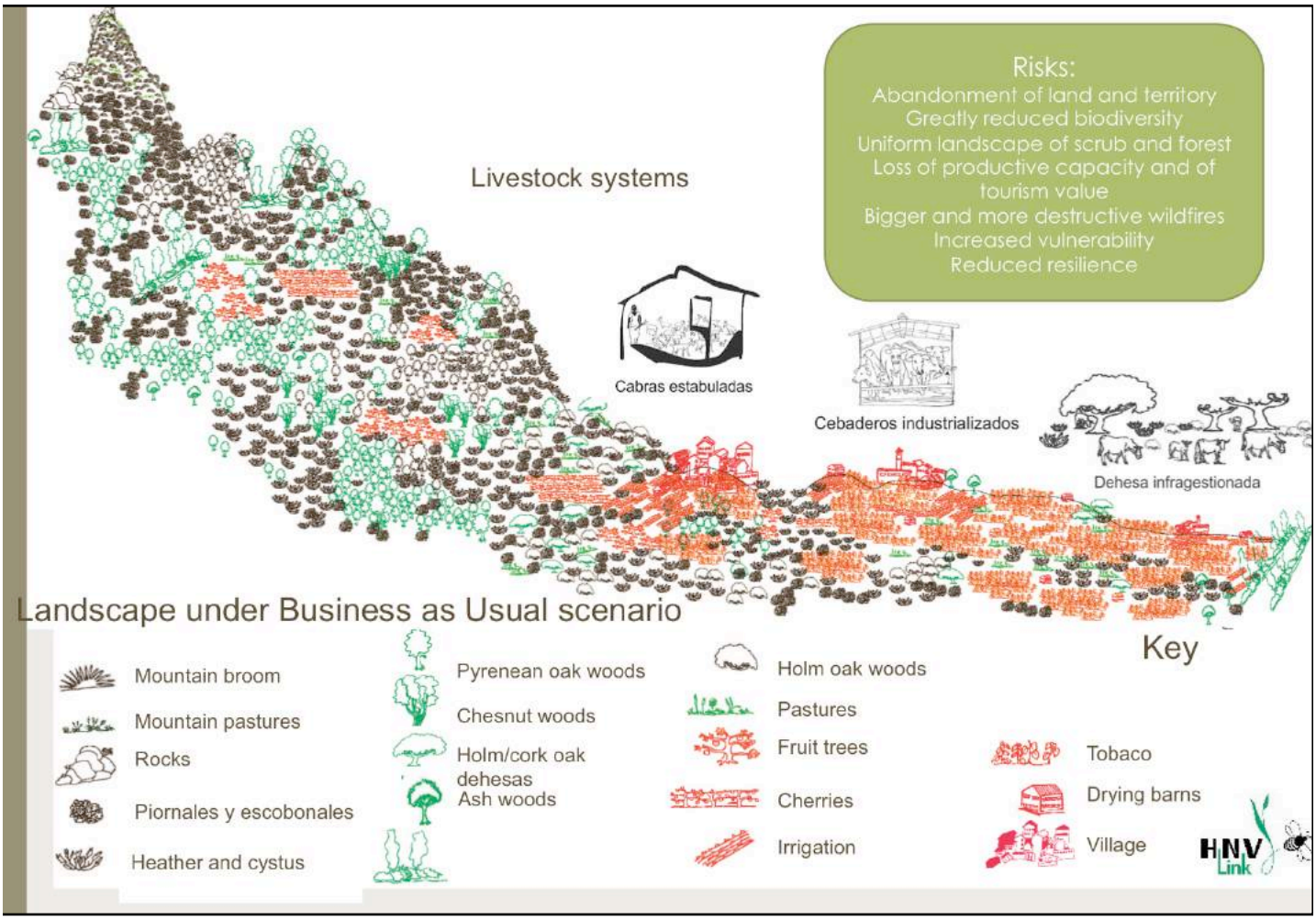


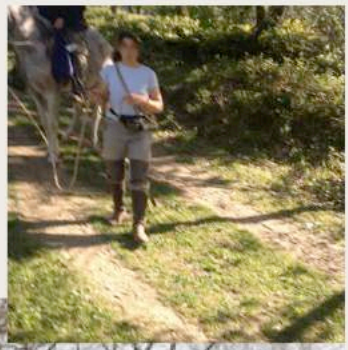
Photo source: Author's own



Business as Usual landscape

BAU – what people think

We interviewed farmers, mayors, foresters, environmentalists, local development agents and others to find out how people view the current state of pastoralism and the expected BAU scenario



Conservation of the pastoral landscape

Livestock farming is essential for the conservation of the SAC, but farmers do not know what Natura 2000 is because nobody has ever bothered to tell them or ask their opinion about it:

"Conservation is all well and good, but the ones whose job it is are actually destroying the landsape – they make life impossible for pastoralists at every turn"

"Conservation – what does that mean? Stopping everyone from doing anything, so everything is abandoned?"

Goatherds started to disappear about 30 years ago, and there's no sign of the trend stopping:

"30 years ago in Losar de la Vera there were more tan 20 goatherds and 25,000 goats using the upland grazings of the municipality. There's only one left, and he has no successor"

There's a widespread perception of a direct link between abandonment of goat grazing, consequent scrub-encroachment, and fire: *"where the fire happened, there was a lot of dense scrub; you could tell there had been no goats there for a while".*

Barriers and difficulties

Goat farmers are generally quite old, very individualistic, and not valued by society:

"why do you bother coming to school, if you're just going to herd goats with your father?"

Animal health rules and the government campaign to eradicate bovine TB in goats: the biggest current challenge (the sector is in crisis):

"they're slaughtering goats on suspicion they have TB, but instead of the 200 euros it cost you to breed and raise the goat, they give you 30 euros ... if they slaughter 150 animals, you're finished"

Environmental rules are seen as working against graziers:
They stop us from controlling juniper scrub because it's a protected species, but it takes over our pastures and makes them ineligible for CAP payments

Pastoralism – relations with other sectors and the authorities

Hunting: Large estates in the mountains are owned by rich absentee landlords who manage them purely for hunting, a sector that seems well cared for by the regional government, promoted as a motor for rural development, but often in conflict with goat farmers for use of common grazing land.

"For some reason the hunters don't want goats on "their" land. They're ok with cows, but they don't want us goatherds"

Bureaucracy appears to be not joined-up, and farmers pay the consequences
"To do anything you face a mass of paperwork and rules that don't make any practical sense. I was approved a grant of 42,000 euros for a new shed for the goats, but the village council took over a year to give me the building licence, which meant I missed the deadline for claiming the grant – there's no flexibility"

The whole set of policies seems stacked against traditional pastoralists
"the forage our goats have always used is a mix of shrubs, acorns, leaves, bram
browsers primarily. If they exclude all this land from the CAP it'll become worthle
abandoned, then fires will come"

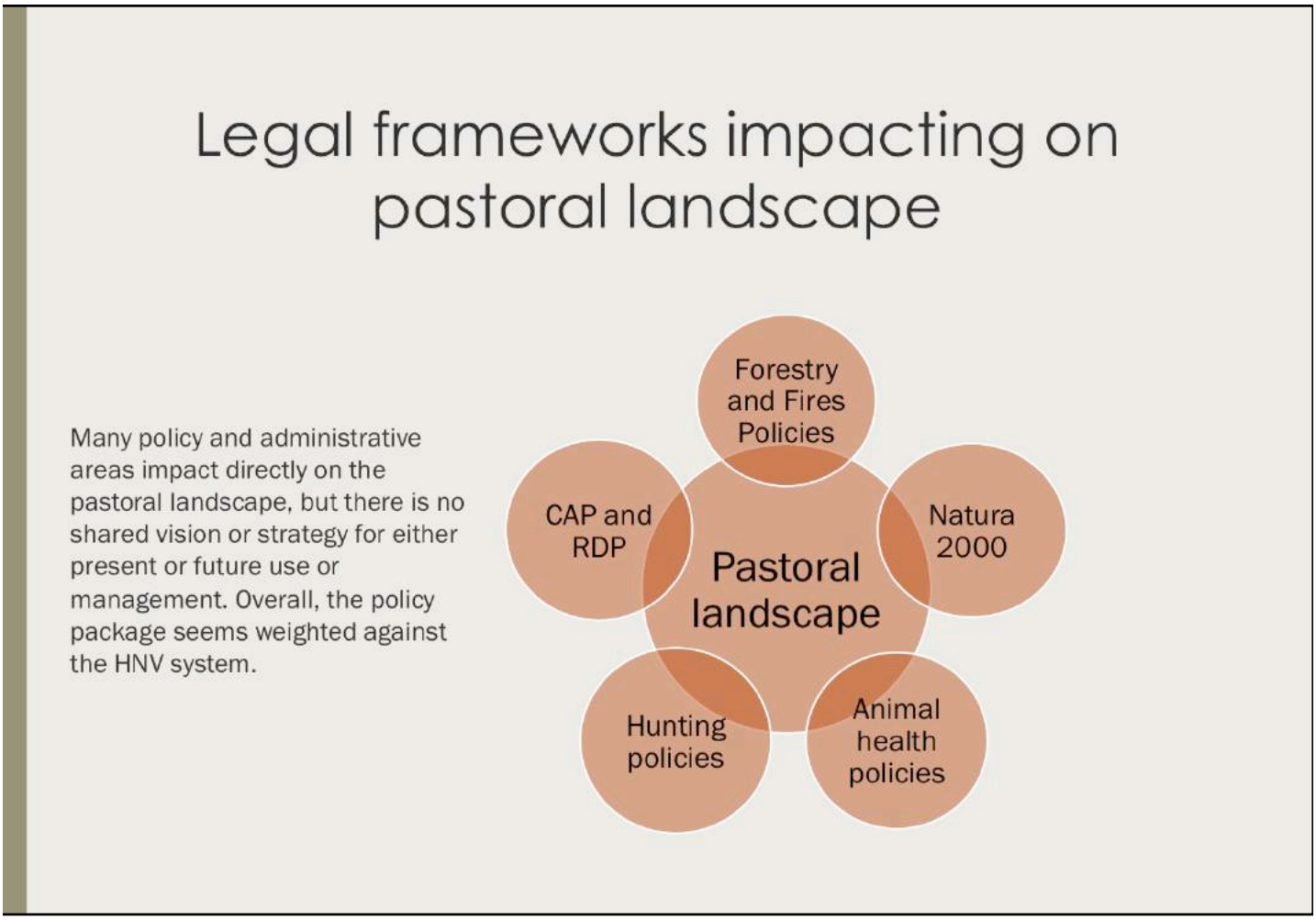
Valorising livestock products

Products from the HNV system aren't valued in the market, not even locally:

"a kid goat is worth almost nothing nowadays, it makes more sense to give them to the dogs as soon as they're born, than to have the expense of feeding them and then giving them away for not much more than 3€ per kilo".

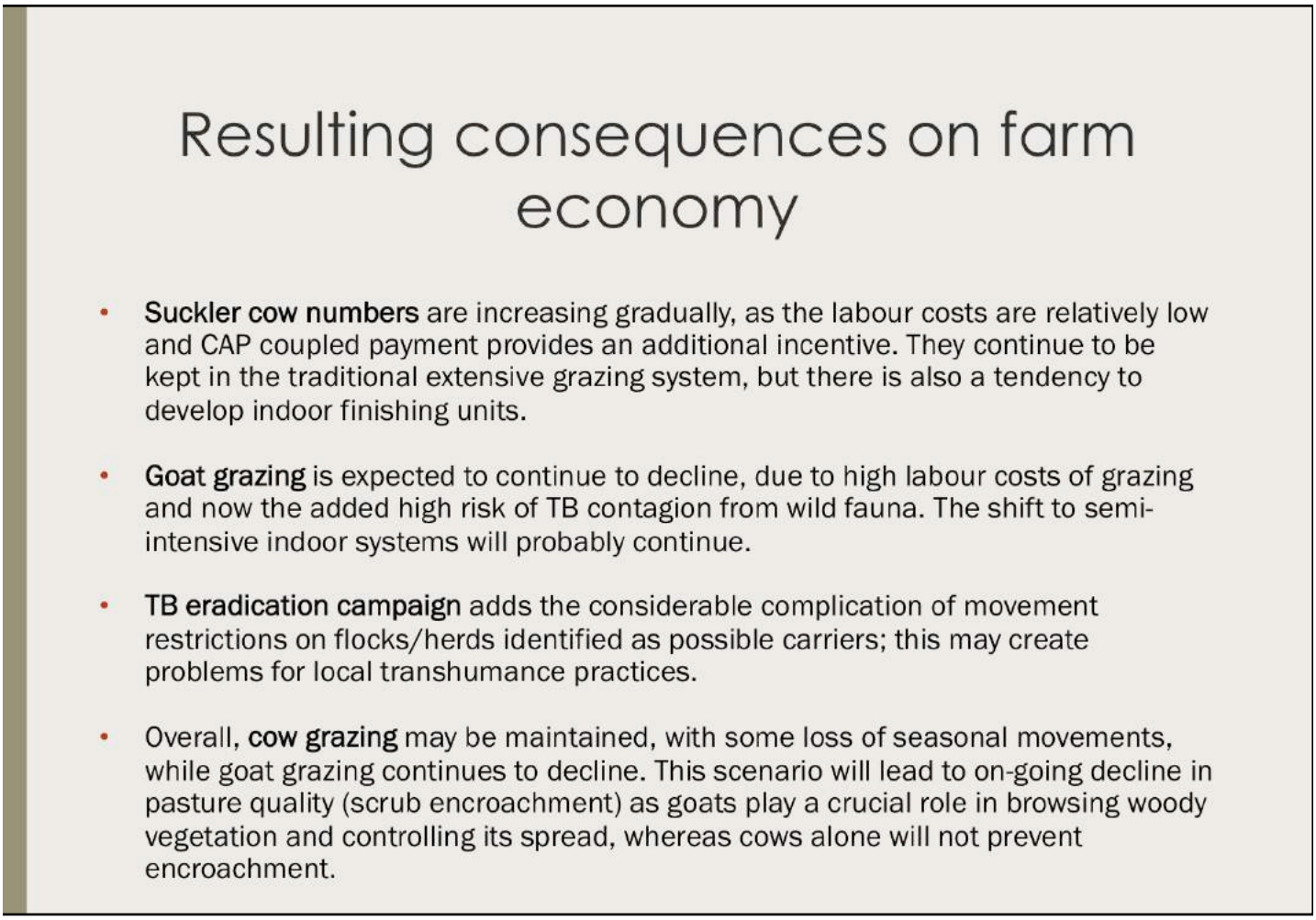
There are no artisan, on-farm cheese dairies in La Vera, despite the enormous tradition of local cheese making. The rules and bureaucracy make it almost impossible:

"yes, I'd really like to start a small cheese dairy, but I'm afraid of all the food hygiene rules, and can't afford to build a factory like they want; and now with the TB eradication programme, nobody can take the risk of making a big investment, you could lose your entire flock at any minute"



From the perspective of the HNV Farmer, especially the traditional goat grazing system, the whole package of policies appears to be weighted against him/her, almost as though they are designed to destroy the farming system and the farmer's livelihood:

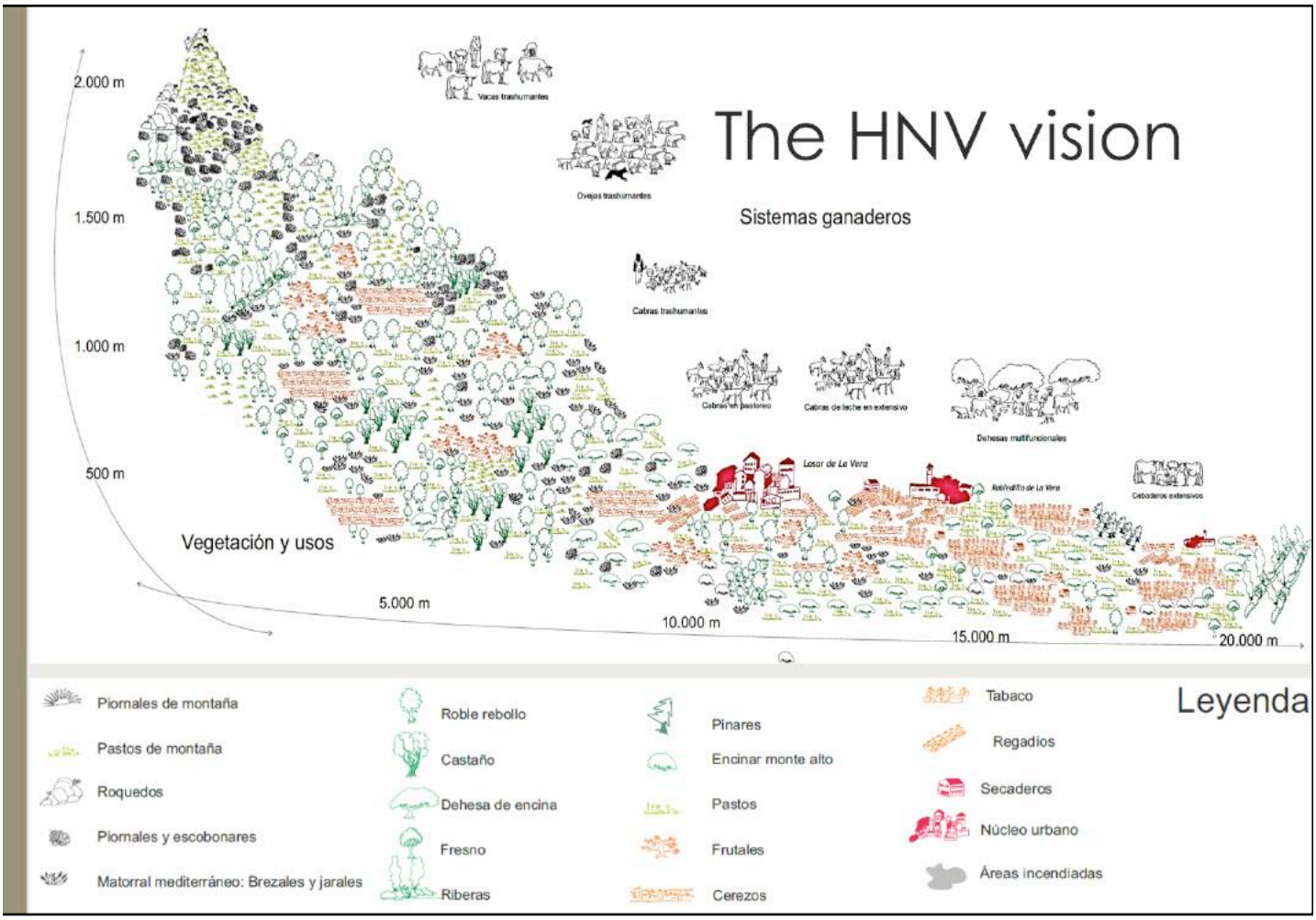
- Implementation of CAP Pillar 1 discriminates against HNV pastures with a mosaic of grass, shrubs and trees, and also against goats and sheep.
- Pillar 2 measures are not used to support HNV livestock systems.
- Ill-conceived animal health campaigns to eradicate Tuberculosis are decimating herds and the farm economy, with no hope of achieving objectives.
- The regional government seems to give more priority to the hunting economy than to HNV grazing systems. TB in wild fauna is not controlled, making extensive grazing in proximity to wild fauna a constant animal health hazard.
- Implementation of food hygiene rules is done in a way that prevents innovative small-scale processing of HNV products.
- Natura 2000 is implemented in a top-down and rigid manner, with no involvement of the actual users and managers of the land, and no positive measures to support or guide their activities.
- Forest policy has an ambiguous approach to livestock: it has supported grazing in the past through investments in infrastructure and scrub-clearance, but the new CAP does not allow investments on permanent pastures from the forest authority.



The field work shows a very tight economy for goat breeders. The prices of milk are a little more stable, but they are too short. The price of the meat is under production costs. There are no incentive to keep grazing as main source of fodder.
Cattle farmers are a little better rigth now in economic terms. Despite the meat prices being low there are some exports that are balancing the figures. Anyway, they rely on intensive fattening for finishing the pieces which is good as preserving grazing for reproductive cattle, while harming the HNV by intensification. There is a need for further analysis that we are currently performing.
Cattle farming is a key HNV system, though it is less threatened than pastoralist goat farming. The rogh situation of the extensive goat sector has biased our analysis toward this system, tough our efforts are increasing significantly on the extensive cattle.

Resulting consequences on land-use and biodiversity

- Increasing homogeneity of landscape, with large areas of dense scrub and forest (dominated by oak) interspersed with intensively managed tree crops.
- Widespread loss of semi-natural habitats, including Annex 1 habitats.
- Landscape becomes less open, less valuable for mosaic-loving species (butterflies, birds) and less accesible for tourism.
- Fires become larger and more damaging.

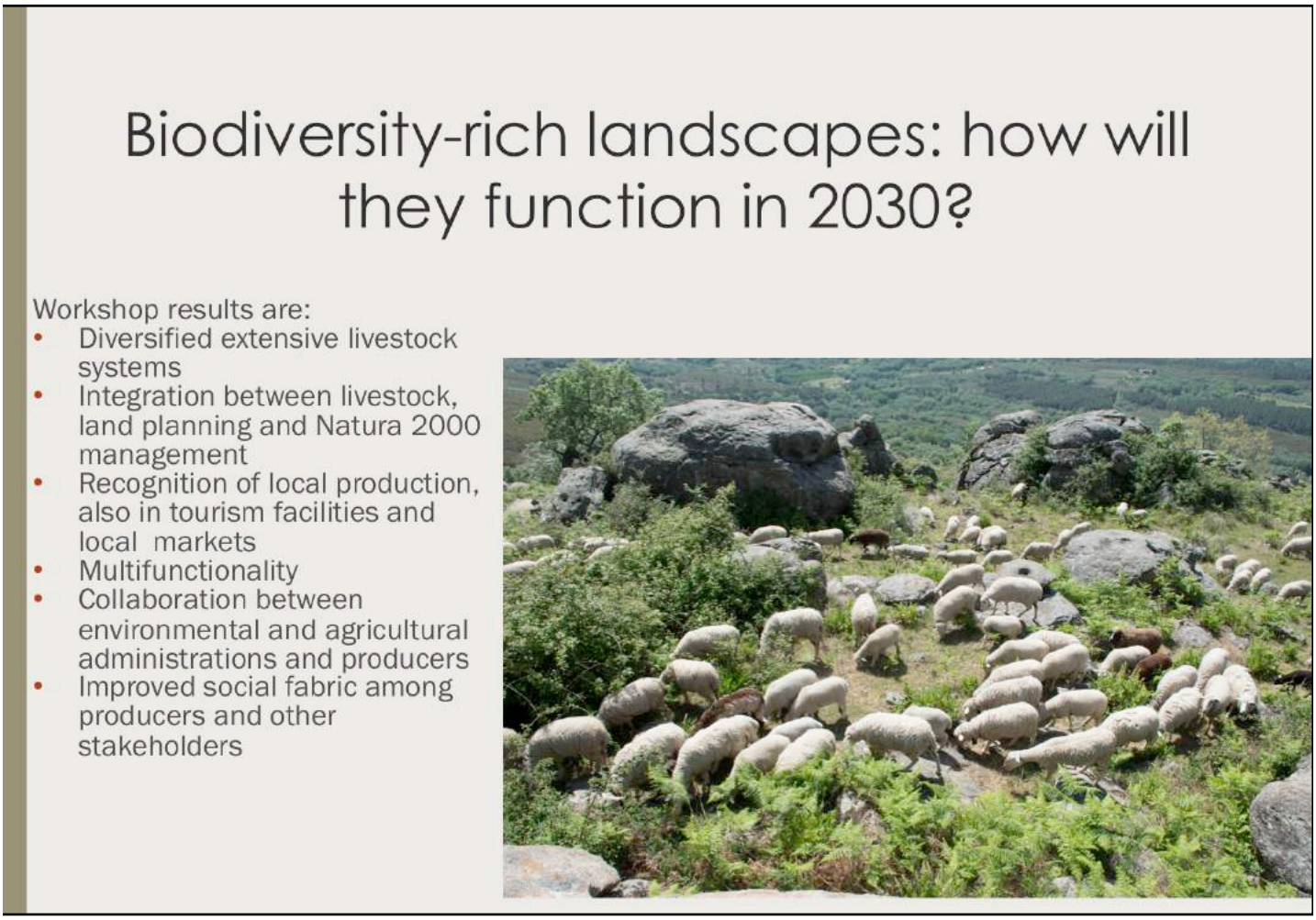


Grazing systems

The number of goats is back to its level of 15 years ago (double the current number).
There are young people working as shepherds and running extensive livestock farms.
There is a shepherding school in the district.
The livestock density in the dehesas is better adapted and more sustainable.
Upland pastures are in healthy condition, free from scrub encroachment and in active use under a variety of systems, and farmers are content with grazing conditions.
The network of drovers' roads is kept in good condition and is in active use by graziers.
There are good infrastructures for livestock, including access, corrals and sheds, in all areas of pasture including in the mountains.

Products and markets

Products from extensive livestock systems are for sale on the farm, and available to local people and tourists, as occurs in other parts of the EU (e.g. France).
Artisan practices are combined with new technology to the benefit of producers, local people and the public good.
There is a commercially successful network or association of livestock producers in La Vera with their own label that promotes the products of extensive grazing systems.
In La Vera there is increased consumption of local livestock products, including in restaurants, with the specific farm identified on the label, menu, etc.
Consumers are able to distinguish livestock products of local grazing systems from those produced under intensive systems.
Tourists come to La Vera in search of local products from traditional livestock systems, and find them readily



Landscape and habitat management

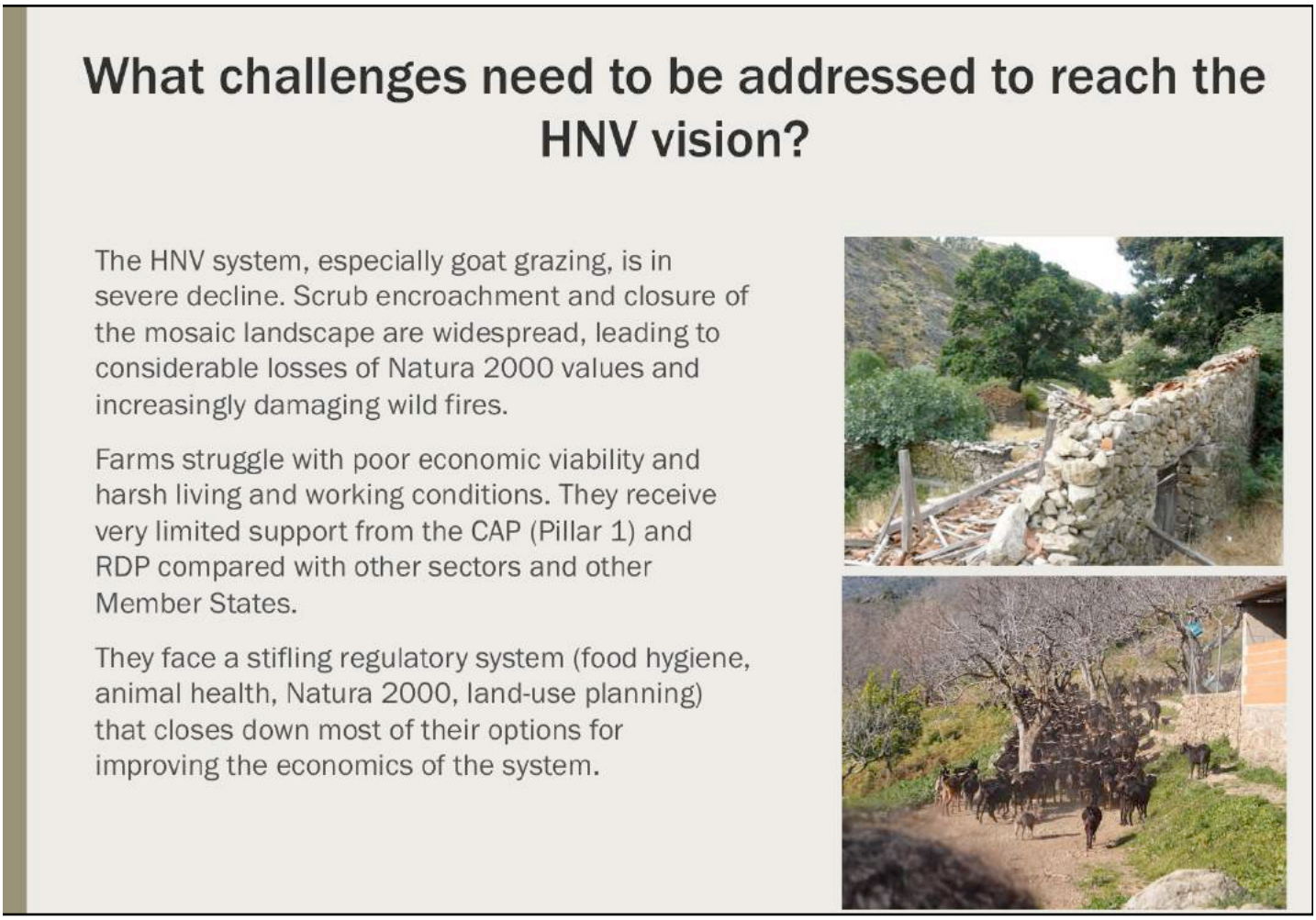
Vegetation is controlled by planned grazing systems at a landscape scale.
The process of scrub encroachment of pastures is halted and reversed.
The dehesas are undergoing regeneration of tree cover.
The most threatened pastoral habitats (e.g. hay meadows) have targeted measures to incentivise their long-term maintenance.
Oak woods have progressed towards high forest and are maintained through a mix of silvicultural management and grazing.
The incidence of wild fires is greatly reduced.
Wood and timber are exploited in a way that is compatible with livestock use of the forage resource.
Multiple uses combine to sustain a balanced exploitation of "montes", including resin, wood and timber, livestock products, honey, mushrooms, hunting, etc.
Biomass is exploited for alternative uses, such as energy.
Native pine woods are extended in the river valley area.
Local people and tourists are more informed and educated about environmental conservation and the role of pastoral systems in maintaining the landscape of La Vera.

CAP

The CAP is implemented in a form that gives priority to public goods, such as landscape conservation and fire prevention. In terms of eligibility for CAP support payments, pastures with scrub and/or trees are not penalised compared with grass pastures, if there is evidence of a sustained grazing activity. A specific agri-environment measure is available to support balanced grazing under extensive livestock systems, and the majority of extensive grazing farms in La Vera are participating in the scheme. RDP measures are available to finance improvements for all pastures and their infrastructure, in an approach adapted to nature conservation objectives. A project is financed through the RDP (Operational Group, LAG, or another measure) through which farmers are supported by a dedicated “animateur” to work for the improvement of the situation of grazing and extensive production in La Vera.

Rules, regulations and official plans

Bureaucracy is simplified, integrated, accessible and flexible. Animal health controls are operated on a rational basis, taking account of wild fauna vectors and of the farmer’s situation (extensive grazing with seasonal movements on common grazings). Small-scale processing and sale of products from extensive grazing systems are supported financially (e.g. by LAG) and their development is facilitated by an adapted and integrated implementation of all relevant rules and regulations (food hygiene, land-use planning, environment, tax system, etc.). Producers and government officials are all fully informed about the application of food hygiene rules to small-scale and on-farm processing systems, and about how to interpret the adaptability required under EU regulations. Legal steps to follow for direct sales of meat from the producer are clear and well known by producers and government officials.There is an official strategic plan for the conservation of pastoral habitats and fire prevention, developed and implemented with full farmer participation and with the buy-in of all government departments and agencies (including LAG).The SAC Sierra de Gredos has a management plan with quantified objectives for habitat and species conservation, with concrete measures and budgets assigned to each objective, rather than the current wish-list with no measures. Criteria for approving change-of-use applications correspond to the public good, not to private interests. There is accurate, transparent and easily accessible official information about pasture and habitat plans and objectives in the district.



Main challenges to HNV livestock farming in La Vera

The HNV system in La Vera, especially goat grazing, is in severe decline (50% loss of goats and sheep in the past 15 years). Scrub encroachment and closure of the mosaic landscape are widespread, leading to considerable losses of Natura 2000 values and increasingly damaging wild fires.

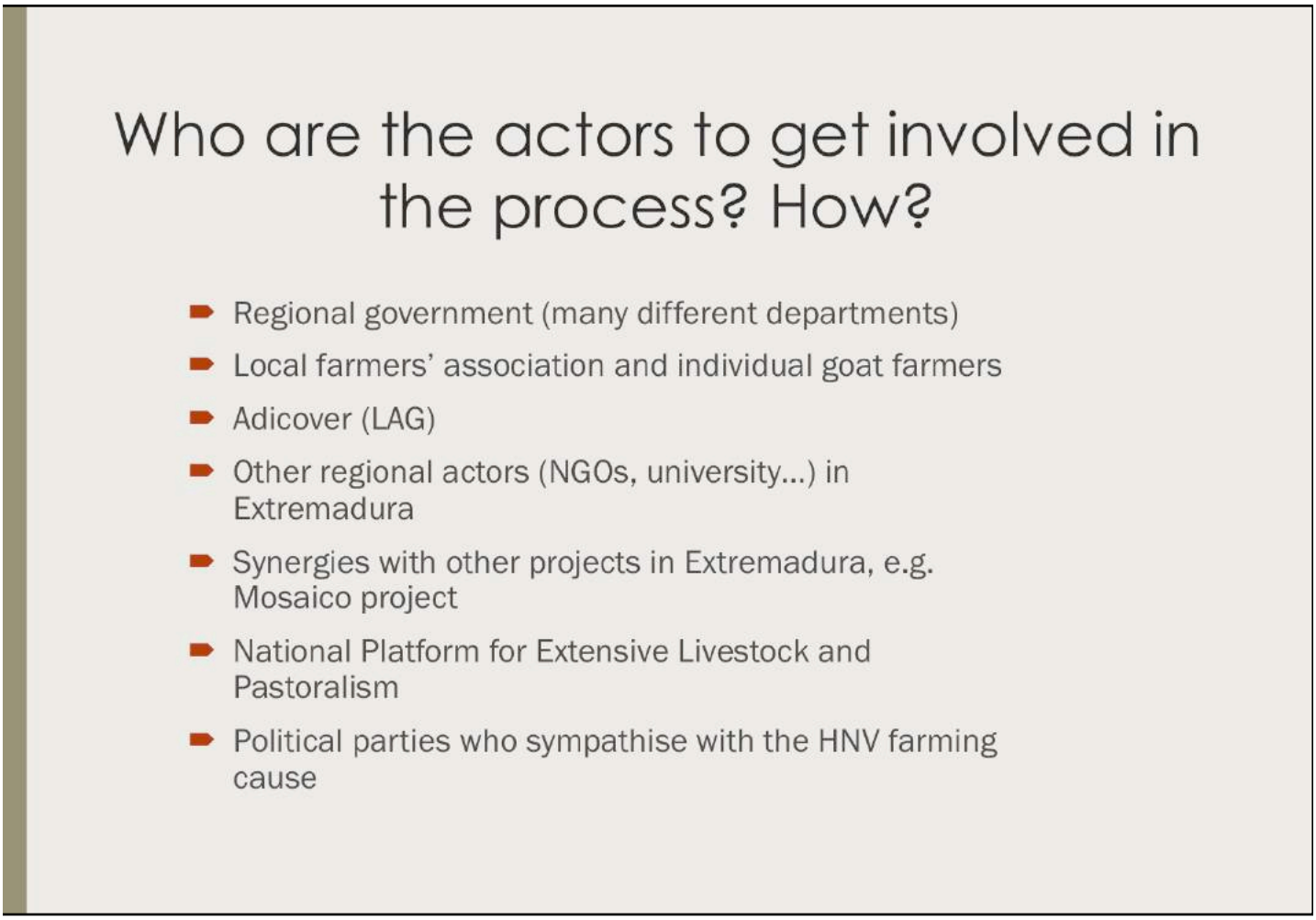
Farms struggle with poor economic viability and harsh living and working conditions. They receive very limited support from the CAP (Pillar 1) and RDP compared with similar systems in other Member States and with other sectors in Spain. They face a stifling regulatory system (food hygiene, animal health, Natura 2000, land-use planning) that closes down most of their options for improving the economics of the system.

Pastures are mostly in shared use (public and private) and are in very poor condition and suffer competition from hunting use. Only one pastoral unit has a management plan. Moving to indoor feeding systems is the obvious alternative to the challenges of extensive grazing on unfenced pastures.

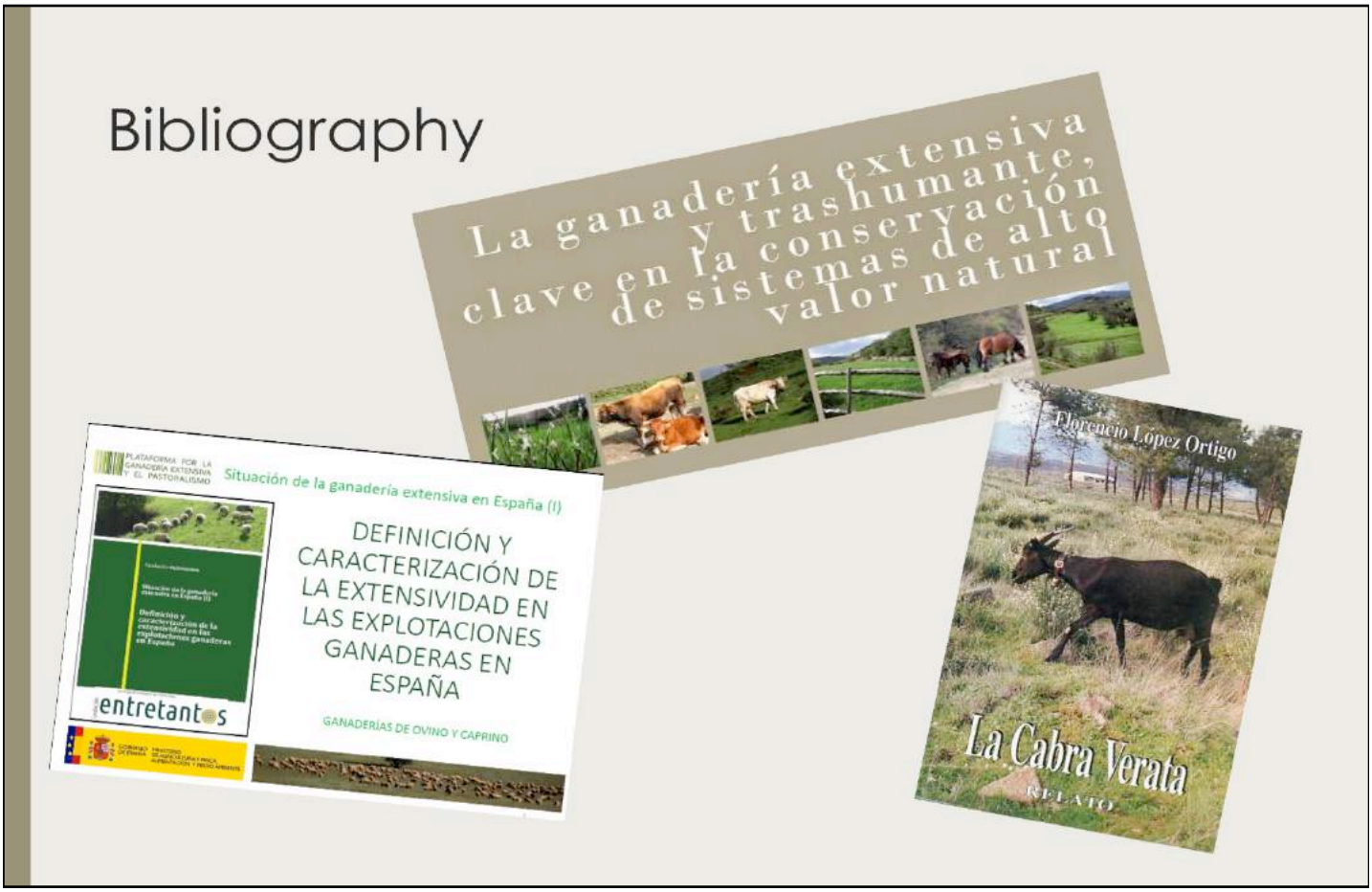
On-farm processing and direct sales cannot develop due to rigid rules and bureaucracy. Milk is sold mostly to bulk buyers at low and highly unstable prices. There is a lack of product differentiation for cheeses and goat meat from grazing systems, compared with intensive indoor feeding.

Currently, goat farms are suffering the effects of a very severe, top-down campaign by the regional authorities to eradicate TB. Thousands of goats are being slaughtered, but the test being used has a high incidence of false positives, and TB is carried by increasing populations of wild boar and deer, for which there is no TB eradication programme.

Regional government policy has no vision for the future of upland grazing systems, rather there is a fragmented and dysfunctional set of parallel policies for agriculture, forests, hunting, animal health and nature conservation that between them are driving the HNV system into terminal decline.



We propose to build alliances on a selection of priority proposals, and to develop a dialogue with key implementing actors (regional government, LAG) to promote these proposals.



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A thematic network on High Value Farming
Learning, INnovation & Knowledge

LEARNING AREA « DALSLAND » (Sweden)

A BASELINE ASSESSMENT

Authors: Lars Johansson, Magnus Ljung, Stefan Arvidsson, Tove Ortman
Date: July 2017

LÄNSSTYRELSEN
VÄSTRA GÖTALANDS LÄN

RådNu
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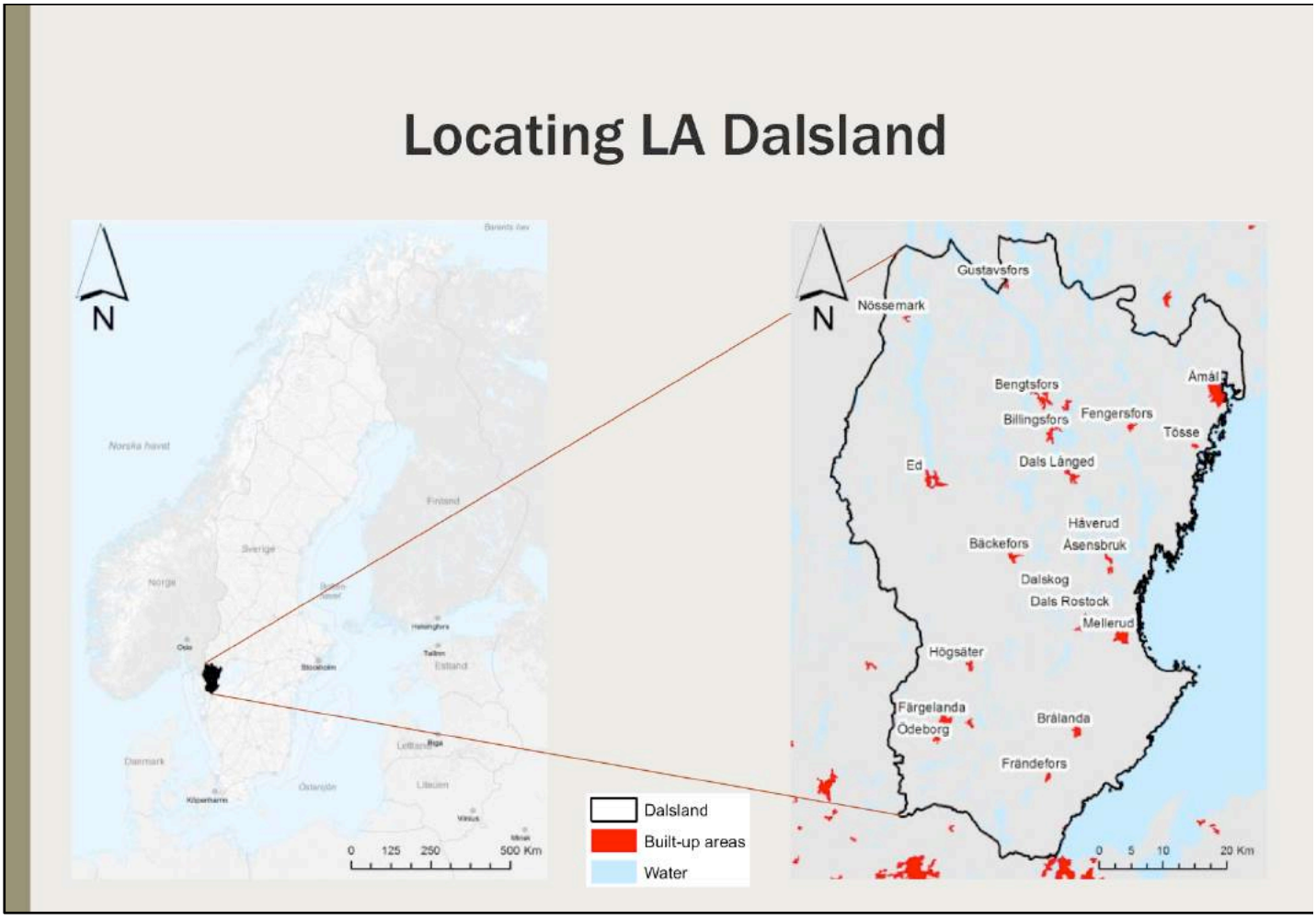


The Dalsland LA is located in southwest Sweden, along the western shore of Lake Vänern and partly bordering Norway. The Learning Area is sparsely populated, with small towns scattered in the landscape. Dalsland is one of Sweden's 25 landscapes and became a Swedish province during the 13th century.

Dalsland, as a geographic area of of approximately 4000 km^2, has no administrative function nowadays, but within its geographical boundaries there are five and a half municipalities (communes). These municipalities still collaborate, reflecting their shared history and sense of cultural belonging.

Dalsland still has an official position which is reflected in having official weapons and appointment of Duke titles within the Royal family (Sweden being a monarchy). Landscapes contributes to a sense of self-in-place, and is therefor often stronger connected to peoples place-identity than new administrative borders. For many Swedes there is a strong connection between the landscapes they live in and the cultural heritage and local traditions.

Several aspects have been important when choosing to delimit our Learning Area to Dalsland.

One basic reason is that within Dalsland's borders there are a lot of natural environments with HNV-qualities. In addition, there are also large areas which could regain such qualities after restoration.

Another reason is that many of the actors who will be instrumental in turning a negative HNV-trend belong to social networks and organisations, and share contacts, symbols, and brands, which depends on a joint identity ("Dalslänning"). There are a lot of examples of this, both in food, tourism, sport, media, local environmental NGO's, and local authorities.

A third reason is connected to logistics. The stakeholder groups who need to participate in a collaborative and action learning process in order to manage challenging HNV-issues, are not present in all parts of the landscape Dalsland. But by working with the whole landscape, and all relevant actors, we believe progress is more likely. For instance, animal keepers in some areas with higher animal density might be able to find cooperative solutions with land owners in other areas with high, but untapped HNV-potential.

The strong place identity and pride among stakeholders living and/or working in Dalsland are central aspects to our choice of Learning Area. Such social identity will be a crucial success factor in the forthcoming work.

Inland ice formed Dalsland

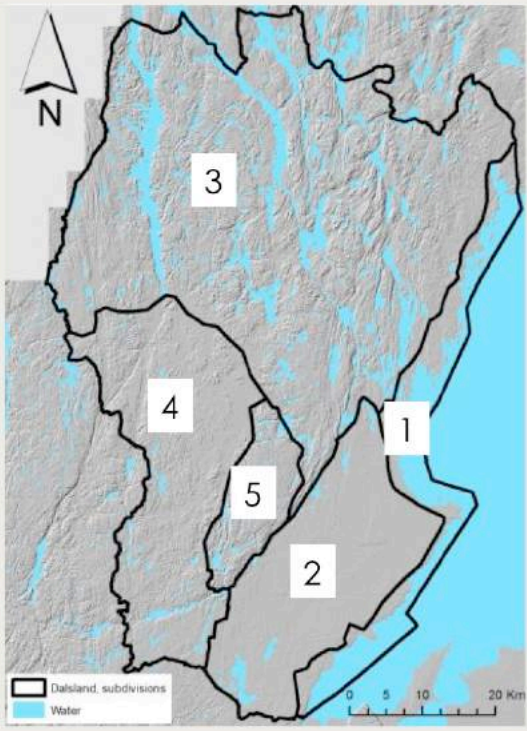
- During the last Ice age Dalsland was covered by a 2,000-3,000 metres thick ice layer.
- The melting started 14,000 years ago.
- Dalsland was freed from the Inland ice app. 9,000 BC.

Dalsland was formed by glaciers. Large parts of Dalsland were below sea level at the end of the last Ice Age. The whole area was for many years an archipelago.

The land, previously weighed down under the weight of the glacier, started to lift. This process of land uplift continues and is today some millimetres each year.

Subdivision

- The land uplift together with the movement of large amounts of material by the Inland ice when melting has resulted in the topography of today's Dalsland.
- Dalsland is sometimes labelled "Sweden in miniature". Partly this is true, especially when looking at topography and nature. To be able to fairly describe the Dalsland LA, we have divided it into five sub-regions.
  - 1: Lake Vänern maritime area
  - 2: Dalbo plain area
  - 3: Forest and lake area
  - 4: Valley area
  - 5: Kroppefjäll plateau area



1: Lake Vänern maritime area
When the land lifted from the sea, Lake Vänern was formed. It is the biggest lake in Sweden, often labelled an inland sea. We have called the shores, coastal zone and archipelago in the eastern part of whole Dalsland the Lake Vänern maritime area.

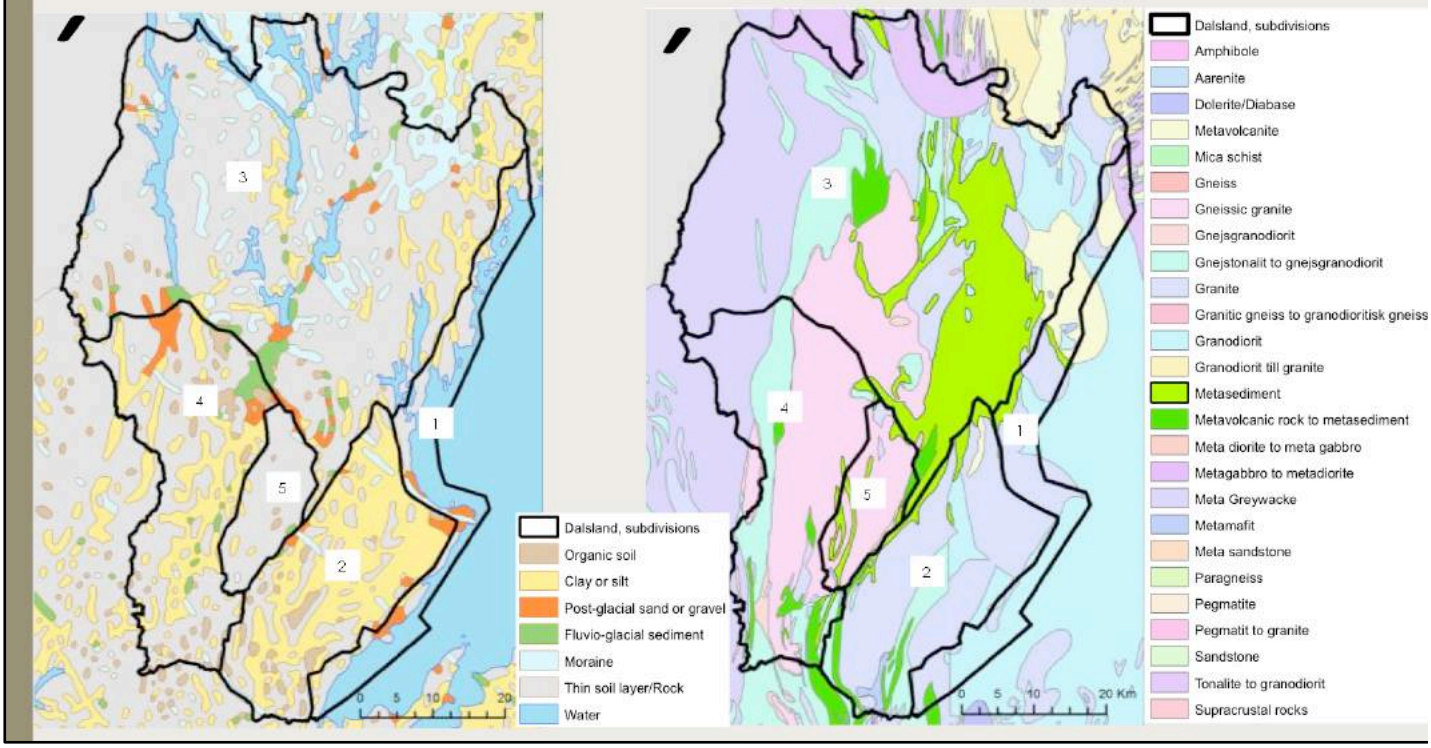
2: Dalbo plain area
The flat lowlands in the southeast part of Dalsland was created by sediments deposited at the end of the Ice Age.

3: Forest and Lake area
The northern part of Dalsland is rich of lakes, hills and widespread forests.

4: Valley area
The ice flow formed a large number of ridges in the landscape. Sediments deposited in the valleys between these ridges eventually formed rich soil, by now mainly farmland.

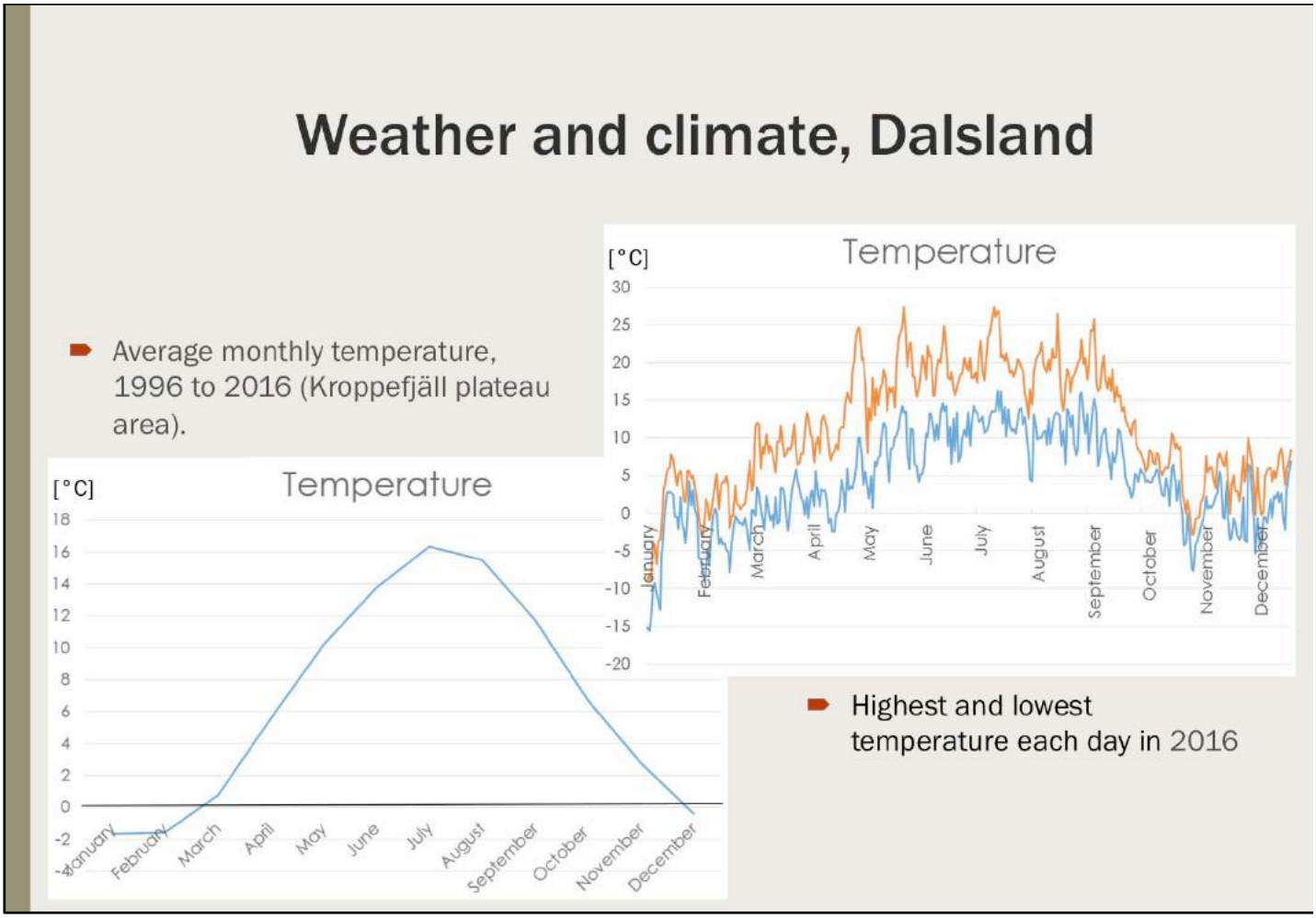
5: Kroppefjäll plateau area
Between the Valley area and the Dalbo plain area there is an upland area dominated by forests. This

Soils and Geology



The distribution of different soils reflects the local conditions by the end of the Ice age. Areas above sea level, for instance the Kroppefjäll plateau area, have thin layers of soil or even an outcrop of bare rock. Areas below highest coastline have been affected by many processes when the ice withdrawn and the land lifted.

The geology of Dalsland is very varied and complex. The so called Dal formation (see the light green colours, metasediment, in the map) is unique for Sweden by its combination of basic volcanic and sedimentary rocks. In combination with a relatively high annual mean precipitation, it creates ideal preconditions for many calcicolous vascular plants, lichens and moss.



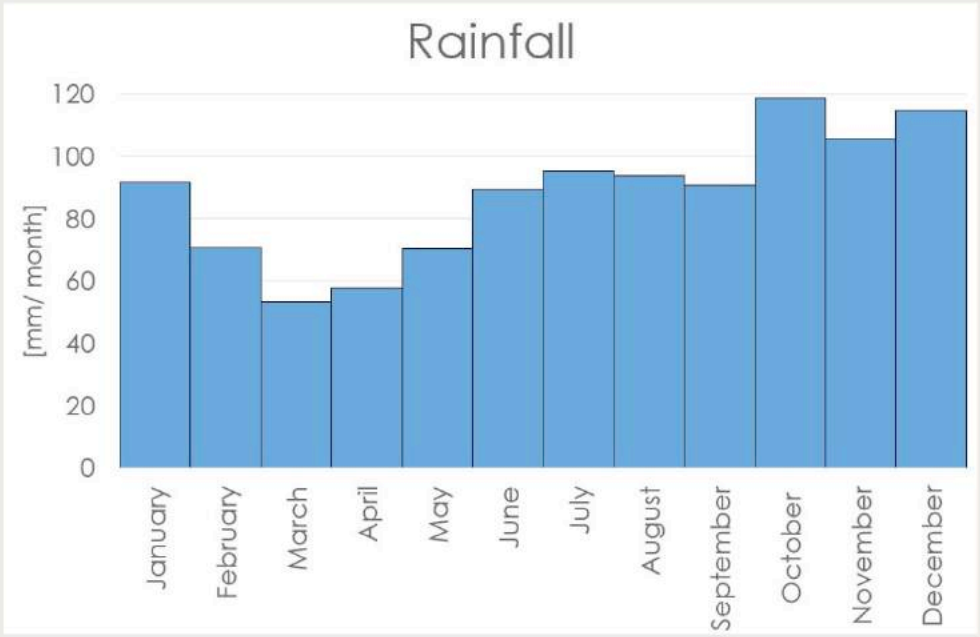
The left diagram illustrates the daily average temperature expressed as a monthly mean from 1996 to 2016 at the weather station Granan at the Kroppefjäll plateau area. July has the highest average temperature (app. 16°C) and the lowest average temperature is in January and February (app. -2°C).

The right diagram shows the highest and lowest temperature for each day during 2016.

What is noticeable is that the temperature varies quite a lot, both in a day and over the year. It is not unusual with fluctuations in temperature of 15°C in one single day. Over the year the temperature fluctuates in an interval of 40-45°C. (Data from the Swedish Meteorological and Hydrological Institution (SMHI) weather station at Granan on the Kroppefjäll plateau area).

Over a longer period of time the temperature has fluctuated much more, up to 70°C. The highest temperature recorded in Dalsland is 34,5°C and the lowest was -38,3°C (SMHI).

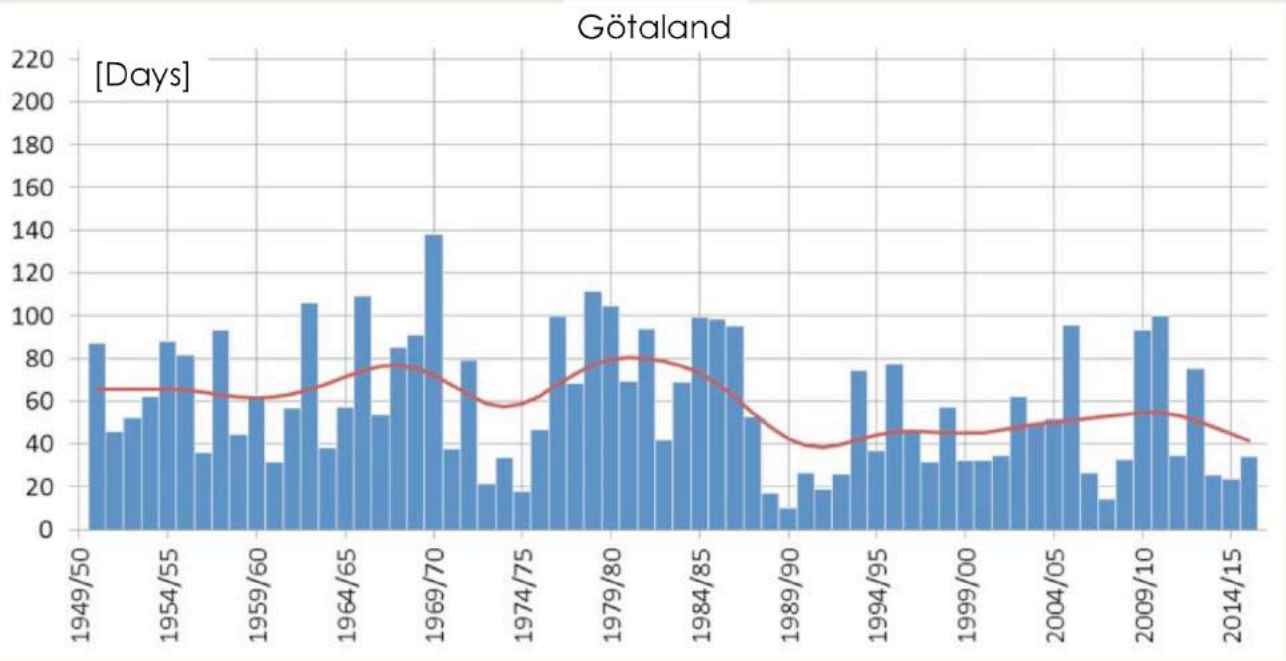
Climate, Dalsland



- Average precipitation per month during the period 1996 to 2016 (the Kroppefjäll plateau area).

The average annual rainfall was 1050 mm for the weather station at the Kroppefjäll plateau area (data from SMHI) during the period 1996 till 2016.

Climate, Southern Sweden



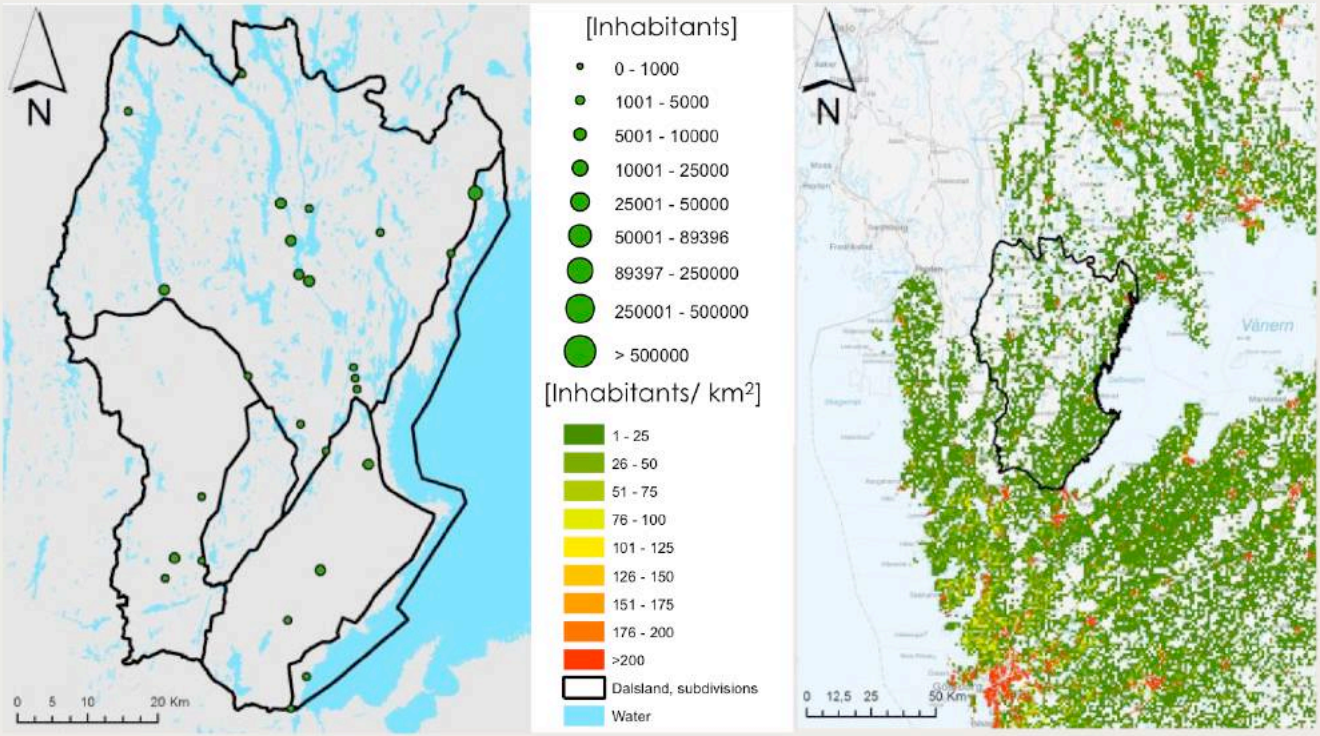
Number of days with snow cover (Götaland, Southern Sweden).

The diagram shows the number of days with snow cover each year from 1949/1950 to 2014/2015. The data is an average from 12 weather stations in Götaland, Southern Sweden (data from SMHI).

The number of days with snow cover varies much from one year to another. Some winters there is a very short snow season, as for instance in the early 1990's with only 10-20 days of snow cover. But some winters have had snow cover for more than three months. Dalsland is located in the northern part of Götaland, which means that the average number of days with snow cover is higher here than what the diagram shows.

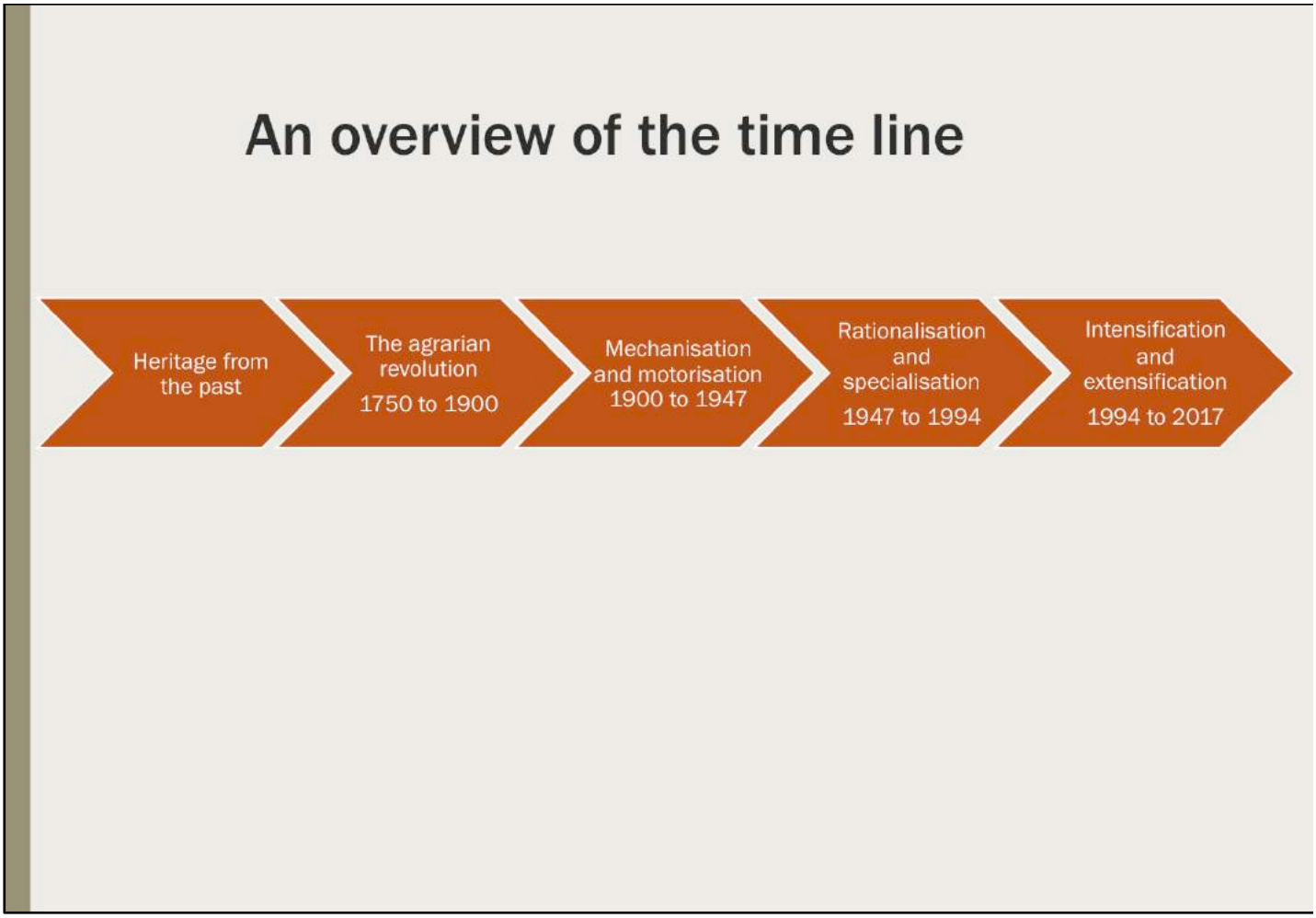
The rather wet climate, the big fluctuation in temperature over the year and between years, including periods of snow, creates constantly changing preconditions for plants and animals, as well as for farming. Historically the farming system in the area continuously adopted to these changes.

Population density



About two thirds of the population in Dalsland lives in smaller municipalities. Åmål is the only city and has a little more than 10,000 inhabitants.

The average population density in Dalsland is 10 inhabitants/km^2, but outwith urban areas it is only approximately 3 inhabitants/km^2.



The processes that have formed the landscape and both created and changed the natural and cultural values can be divided into five distinct but overlapping phases. We have chosen to focus particularly on the changes of the last 100 years, but whereas this period has been described in three phases, these sub-divide what is in many ways an ongoing trend and continuous development process.

Heritage from the past

Agriculture expands

- 500 BC, the Iron age. A colder climate forced people to keep the cattle inside over winter.
- Agriculture nevertheless expands and agricultural settlements are built.
- The meadow and a farming system of infield(s)/ outfields (commons) emerge.
- In Dalsland there are140 grave fields and 25 ancient castles from this period.

Photo credit: Lars Johansson

Within the prehistoric time period, it is from the Iron age that most traces of human activity have survived in the landscape and which could be seen also today, perhaps the most obvious being the grave fields. Around year 1000, the area was Christianised and the use of traditional grave fields ended. The photo is from Ättehögskullen in the Valley area.

No settlements have been found from this time period in Dalsland. The most common explanation is that there has been a strong continuity in farming on the same piece of land. Consequently, there has been no need to move away from the agricultural settlements originating from the Iron age, why new buildings and human activities throughout history have hidden every trace of the Iron age at these spots.

Heritage from the past

A farming system based on meadows and outfields

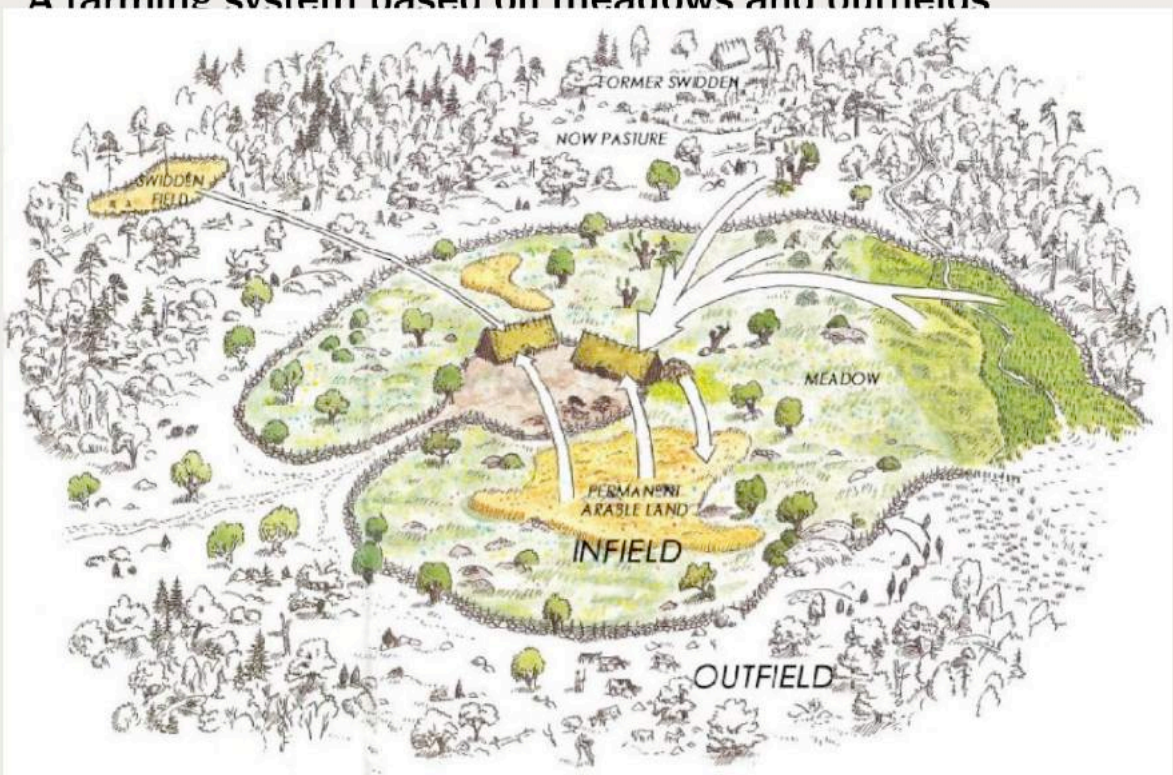
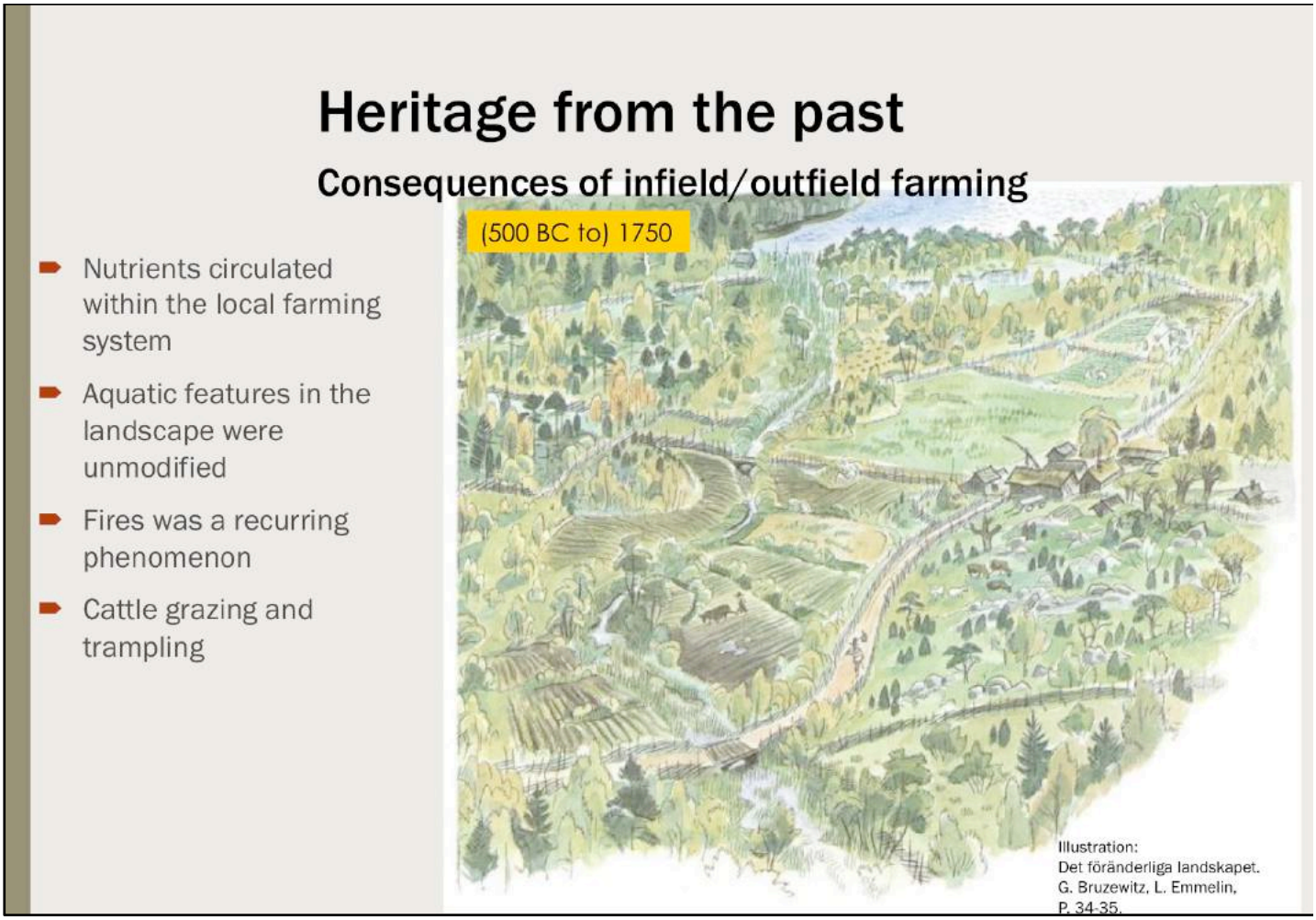


Illustration and text:
Ängar.
U. Ekstam,
M. Aronsson,
N. Forslund,
p. 34-35.

The infield area, which is the fenced area close to the farm, was permanent arable land and meadows. The infield is usually one connected field and all permanent arable land is actively managed each year. On the outfields (the commons) the cattle graze, hence the need to fence the infield.

As a complement to hay farmers harvested large amount of leaves for the winter, from both the infield and the outfield. The manure produced during the winter time was only spread on permanent arable land. Slowly the meadows became poorer (from a nutrient perspective). In the commons temporarily fenced swidden (shifting cultivation/ slash and burn) fields were created. These were not fertilised and after use were allowed to revert to pasture.

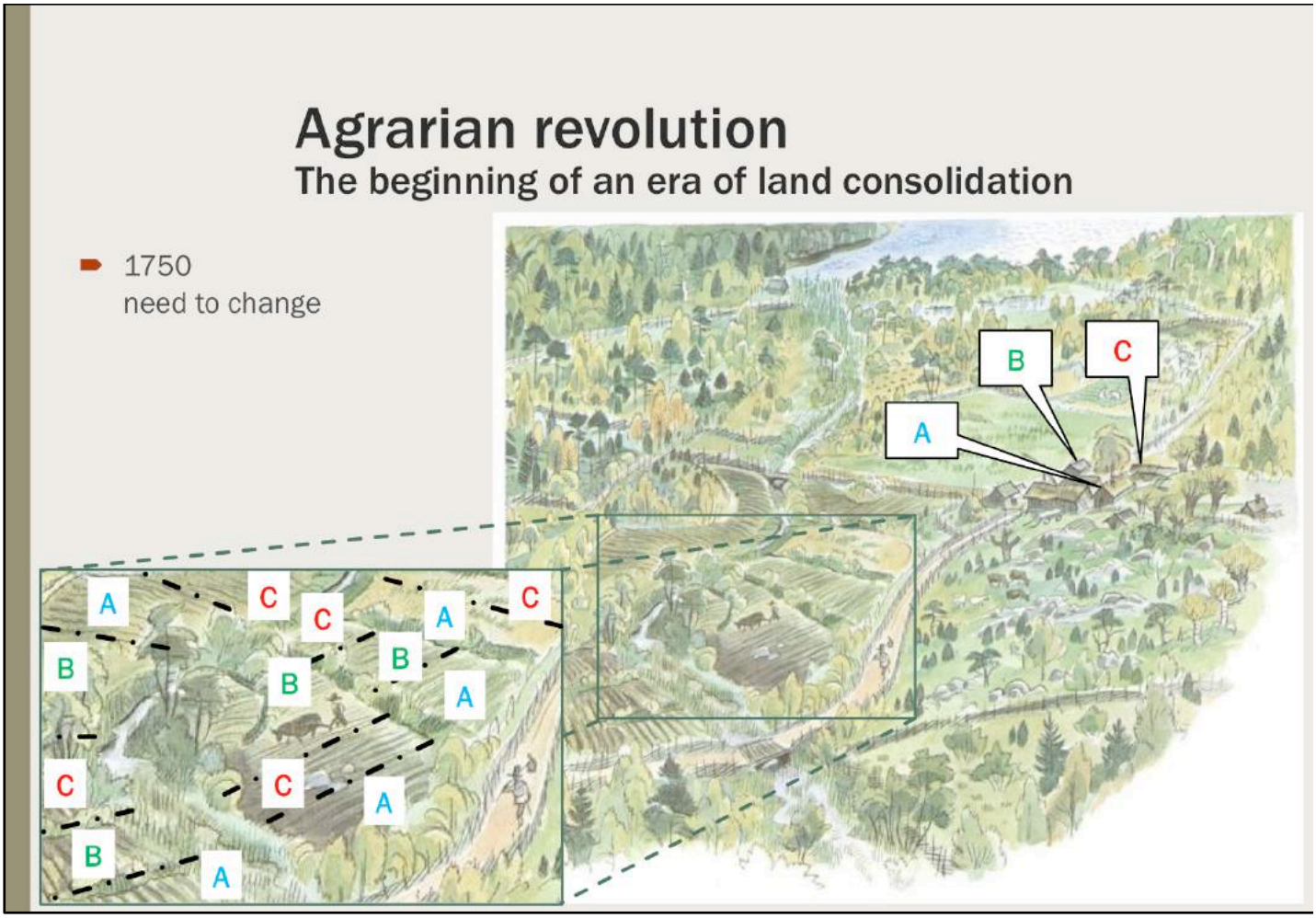


During the more than 2000 years in which the landscape was farmed according to the infield/outfield farming system, the main principles have remained unchanged although the tools, technologies and settlement patters changed slightly over time. The natural processes and dynamics have been intact:

- Nutrients circulated within the local farming system and was not added from external sources. The nutrients from commons, grasslands and meadows fertilized the arable fields in the form of manure.
- Aquatic features in the landscape were unmodified. Annual flooding of fertilised some of the lowlands; the groundwater was at its natural level and small water bodies were scattered all over the landscape.
- Fires was a recurring phenomenon.
- Cattle grazing and trampling had a similar effect on natural processes as the wild herbivores had in earlier times.

Consequently, the farming activities shaped a small-scale and mosaic landscape consisting of many different environments. A diversity of groups of organisms and species easily found suitable habitats and pathways to be spread. From a HNV-perspective the land use during this long period have had many positive consequences. Natural values which we today benefit from.

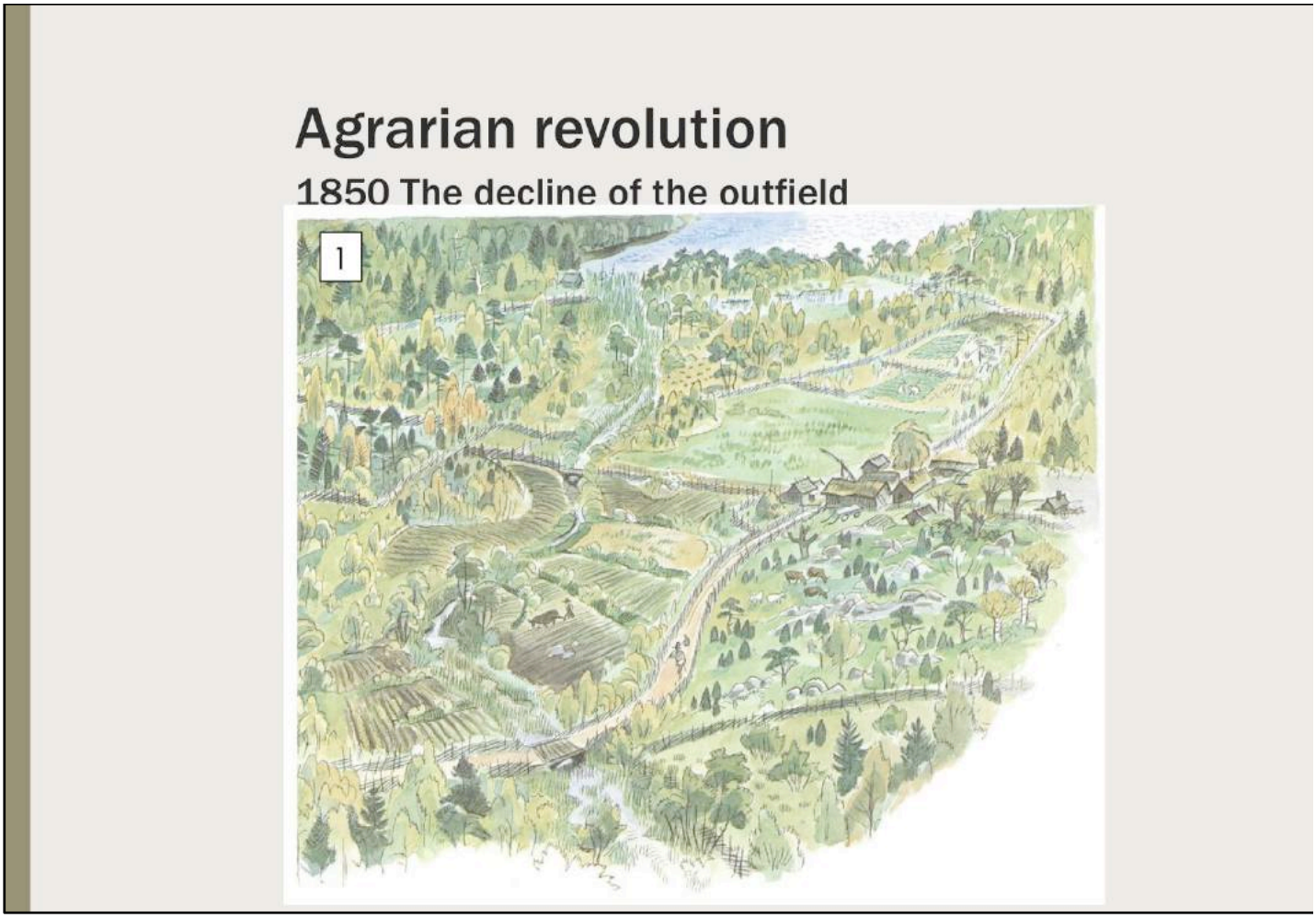
We have a rich archive of historical maps in Sweden. Over one million maps from early 17th century until today is available in digital form. The older maps are particularly rich in details and describes land use very precisely. The illustration is based on maps from 1638 and part of the book The Changing Landscape. The authors have also illustrated later maps from the same area, enabling us to get a sense of the landscape have changed at this specific farm over the centuries. The actual farm is located in eastern Sweden but has many similarities with the preconditions in parts of Dalsland. We thus can assume that the pictures illustrate well how man also transformed the landscape in Dalsland. Although this illustration is based on data from the 17th century, it is likely that it shows quite well what the landscape looked like up until the Agrarian Revolution.



The infield/outfield-system had remained almost the same for about 2000 years. But over time, an ever more fragmented ownership pattern had developed in many areas of Dalsland. With each inheritance, the number of fields tended to increase, which in the mid-18th century finally led to a situation illustrated by the drawings: each farm had its fields spread across the landscape. It has been told that each field sometimes were so small that you could hardly turn your horse or ox when plowing; the harvest from the smallest fields could be carried home in the apron.

The fragmentation of ownership meant in practice that everyone who had small fields next to each other had to plan their measures carefully and together. Although each farmer used the field as an individual, they still had to agree on when sowing, for example, would be carried out, so as not to interfere with the neighbor's ability to access his or her fields. As the strips became ever narrower, the practical and planning difficulties increased. Another effect of a fragmented ownership of land was that it was increasingly difficult for anyone who wanted to try out new ideas to implement them.

Within the State, strong forces began to work to increase productivity and access potential tax revenues. There was a perceived need for some form of land consolidation in order to achieve meaningful changes in agriculture. From the mid-18th century to the beginning of the 19th century, new legislation was therefore developed which in turn became the start of a series of land reforms affecting both the landscape and its people.



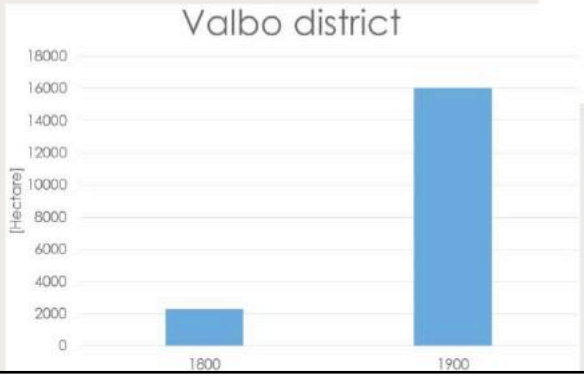
For the whole 2000 years from prehistoric times to the land reforms, the livestock grazed the common outfield (no. 1 in the picture). A large part of the community's firewood and timber were also taken from there. When the industrialization accelerated, the need for timber and wood for sawmills, ironworks and paper mills increased. These factors combined meant that the outfields became increasingly open.

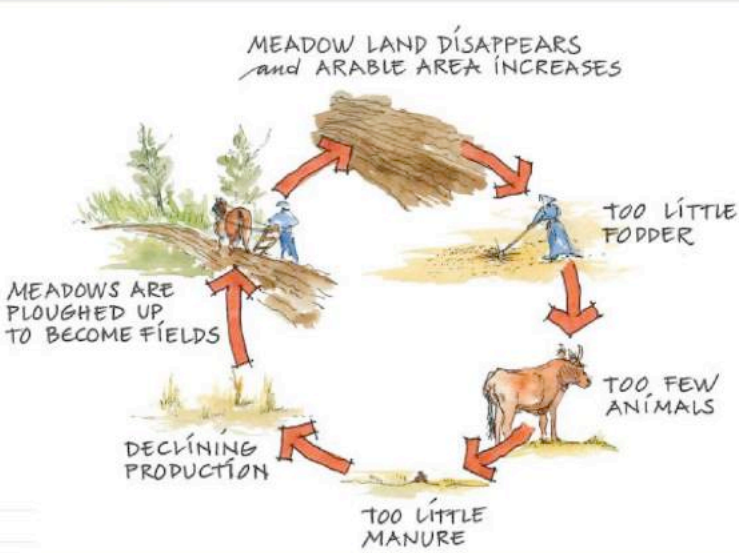
However, at the same time land reforms were promoting the inclosure and subdivision of the formerly jointly owned commons between the individual farms. Many farms continued grazing their own outfield after inclosure, but often at a lower intensity and for a shorter period of time during the productive season. On such farms there was little or no shift towards a more open outfields.

Agrarian revolution

The vicious circle

- 1850
  Profitability of oat production quickly led to an increased interest in ploughing up meadows
- An oat monoculture.
- Loss of productivity on arable land
- Decreasing harvests.



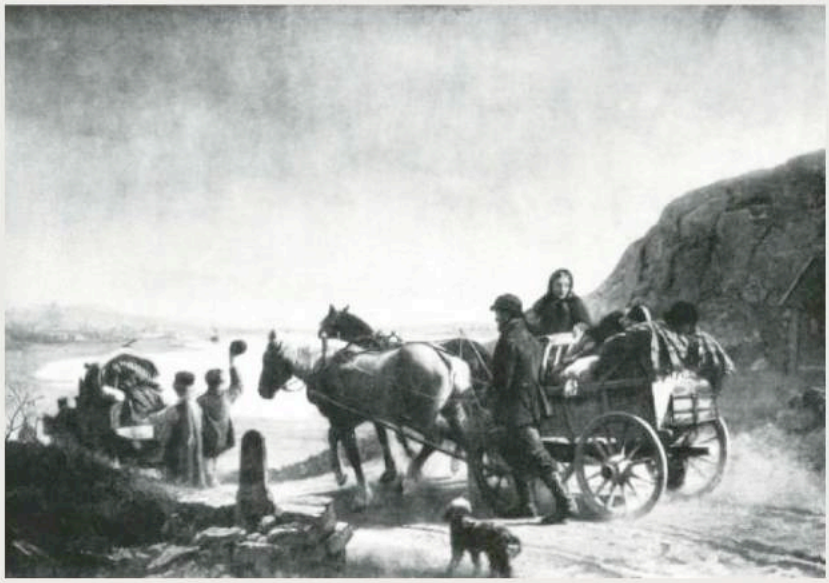


Picture above:
Emanuelsson, U. (2009)
The Rural Landscapes of Europe.
How man has shaped European nature.
P 294

During the mid 1800's, oat cultivation was very profitable. Large areas began to be used for grain production. This led to a reduced area of meadows as well as grass cultivation on arable land. In the long run, it meant that the number of animals was reduced and the amount of manure consequently dropped. This oat monoculture, in combination with a small amount of available fertilizers, promptly led to a large proportion of the arable land losing its production capacity.

Agrarian revolution
Crop failure and emigration

- 1867 and 1868
  Crop failure and starvation
- Emigration to N. America
- Croft settlements
- 1872
  The world market price for cereal fell rapidly
- 1890
  Oat had lost its role as the most important source of income

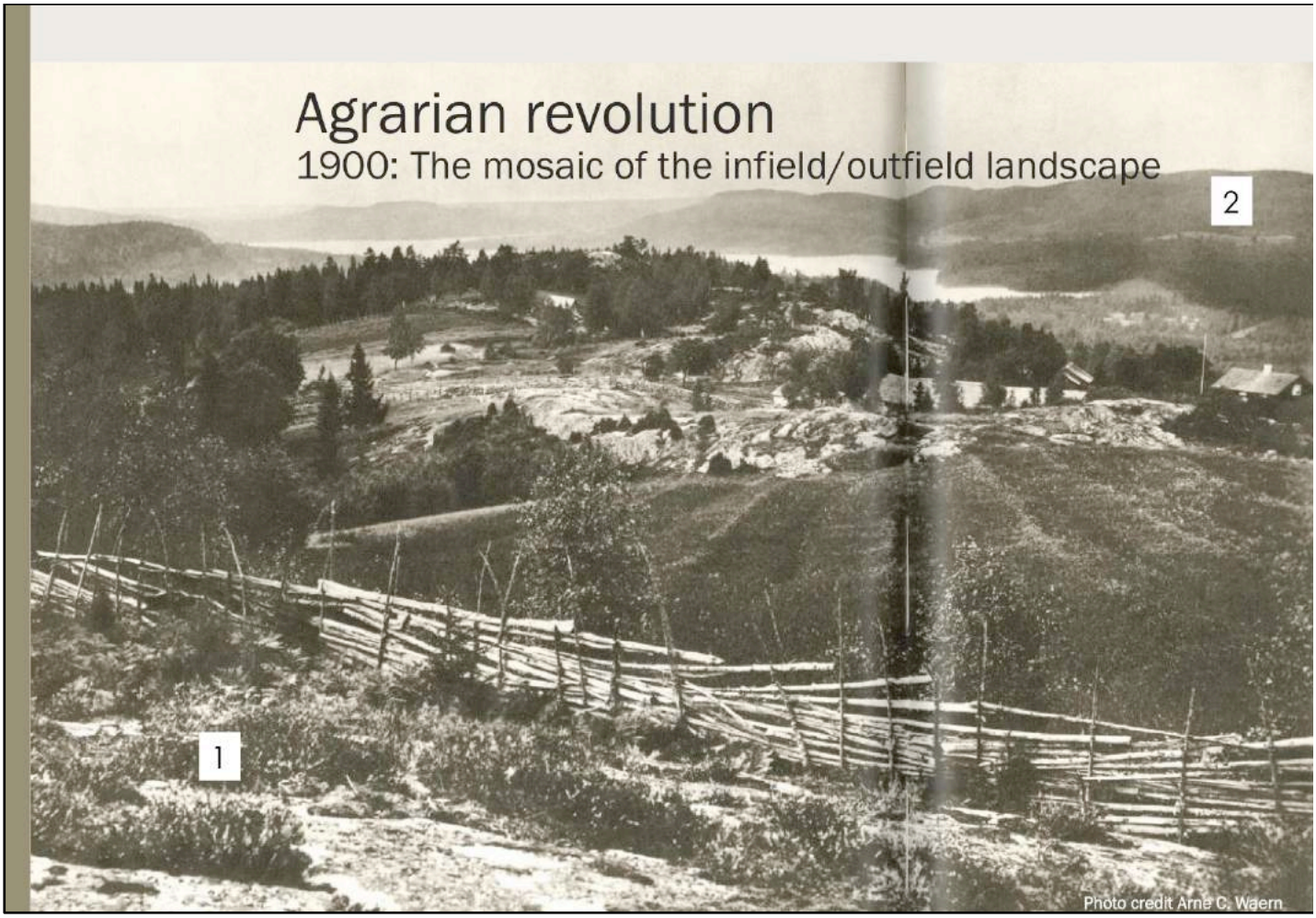


From painting of Geskel Saloman, 1872: Emigrants on their way to Gothenburg

In the literature there are descriptions of 30 single years of distress or crop failure in Dalsland from the early 17th century to the 1860's. The crop failures of 1867 (The Year of Great Weakness) and 1868, when the weather was too poor for sowing cereal crops and both potatoes and root vegetables rotted in the field, in combination with the unilateral dependence on oat cultivation, seems to have led to the most extensive effects. During these years many people suffered from destitution. This led to two new trends:

1) Restoration of villages, crofts and cottages. The increasing population and the decreasing production led to new demands for cultivation of non-arable land. During the 1870s, land was thus reclaimed in areas previously considered not suitable for cultivation, for example, at the Kroppefjäll plateau area.

2) Emigration. From 1860 to 1894, 31,000 inhabitants from Dalsland emigrated, particularly to North America. High birth rates nevertheless kept the population high. Dalsland was the area of Sweden, which, in relation to its population, had the greatest emigration.



How open or closed the outfields were in the late 19th century probably varied between farms and areas, mainly depending on the level of wood and pasture requirements in the previous century.

Nonetheless, we can be quite certain that landscape openness was greater closer to the infields than further away on the outfields. Both a need to keep down transport distances for timber and firewood, and the fact that the animals were taken daily from the outfields for milking or other purposes, gave this result.

What can also be quite certain is that the vegetation on the outfields was a mosaic. Grazing and the needs-driven cutting of woody plants resulted in a blend of completely open surfaces, stand-alone trees and shrubs, less confined groves of trees or shrubs and larger, more closed areas, often located in difficult terrain.

The picture was taken at the turn of the century 1800/1900 and shows views from the farm Högheden which is located in the Forest and lake area. In the foreground (1) there is an open area of outfield located near the farm, and on the horizon (2) relatively open outfields can be seen.

Mechanisation and motorisation
Afforestation

- 1903
  The Swedish Forest Agency is established
- 1903
  New Forest Law
- 1910
  Extremely low forest volume
- 1910
  Afforestation and forestation

Afforestation 1914, Upperud, Lake and forest area.
Photo credit Herman Ahlin.

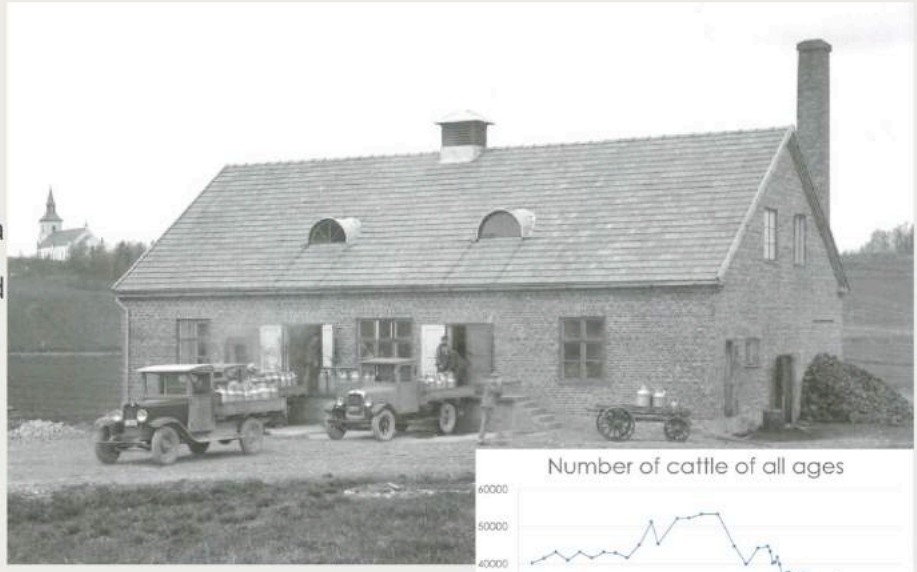
The establishment of the Swedish Forest Agency and the implementation of a more modern Forest Law meant a stronger public governance of the forest resources. The new law focused on regeneration and demanded that the ones clear cutting a forest area also were responsible for its regeneration.

When feed and food production became more high productive, the demand for extensive grazing areas decreased. In combination with a strong focus on forest production it led to that big areas of former outfields and other grazing areas were reforested. It was not unusual that school classes participated in regeneration activities.

Mechanisation and motorisation

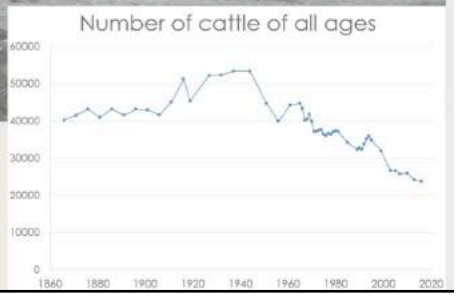
Increased demand for agricultural products

- 1920
  Arable land reaches its maximum area
- Growing population
- First and Second World Wa
- Increased demand for food
- Growing animal production
- Dairies and slaughter houses are established



A dairy in Färgelanda, Valley area, 1930's.

Photo credit Södra Valbodalens hembygdsförening



The growing population and a turbulent time world-wide led to increased demands for food produced within Sweden. Much of the area devoted to growing oats was transformed to sown grassland and animal production boomed once again. A number of new dairies and slaughter houses started.

As shown in the picture, the truck is now beginning to be used for transportation.

In the diagram about the number of cattles, the data from 1981 to 2016 comes specifically from Dalsland. Earlier data has been calculated out of data from the Älvsborg sub-region of which Dalsland was formerly a part (before the creation of Västra Götaland County).

Mechanisation and motorisation

New energy resources and methods

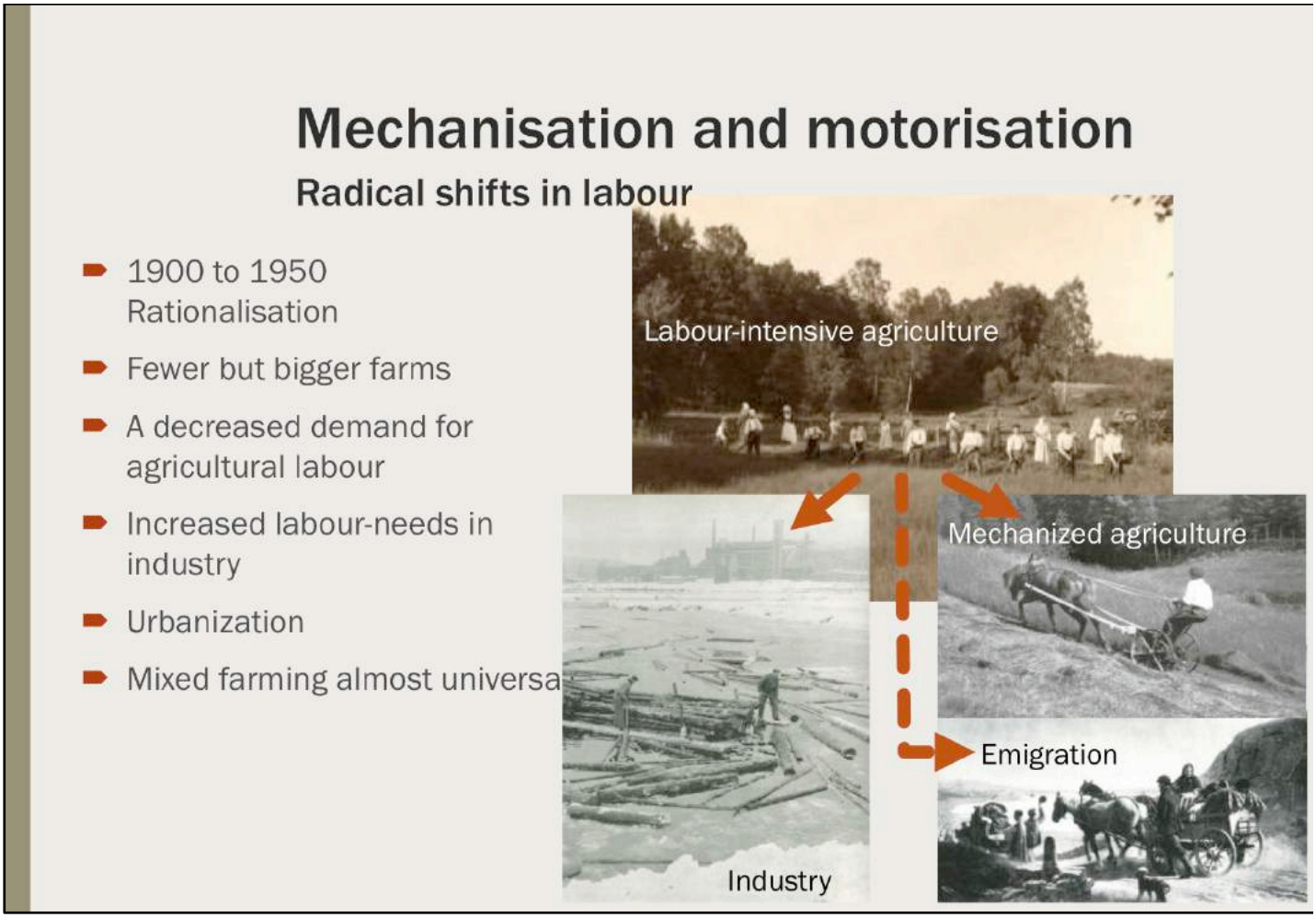
- 1920 Electrification of farms
- 1930 More and more stationary machines in use
- Improved manure management
- 1945 The market for tractors grows rapidly

Thrush advertising from 1920

During the 1920's and following decades, electricity began to operate agricultural machinery. Not least the hay management was revolutionized when the hay lift and hay-drying fans. Other stationary machines, such as thresher, also drastically reduced the need for labour.

Improved manure management in the form of slurry pits, urine wells and roof constructions meant that more of the nutrients could be returned to the fields. This contributed to increased yields.

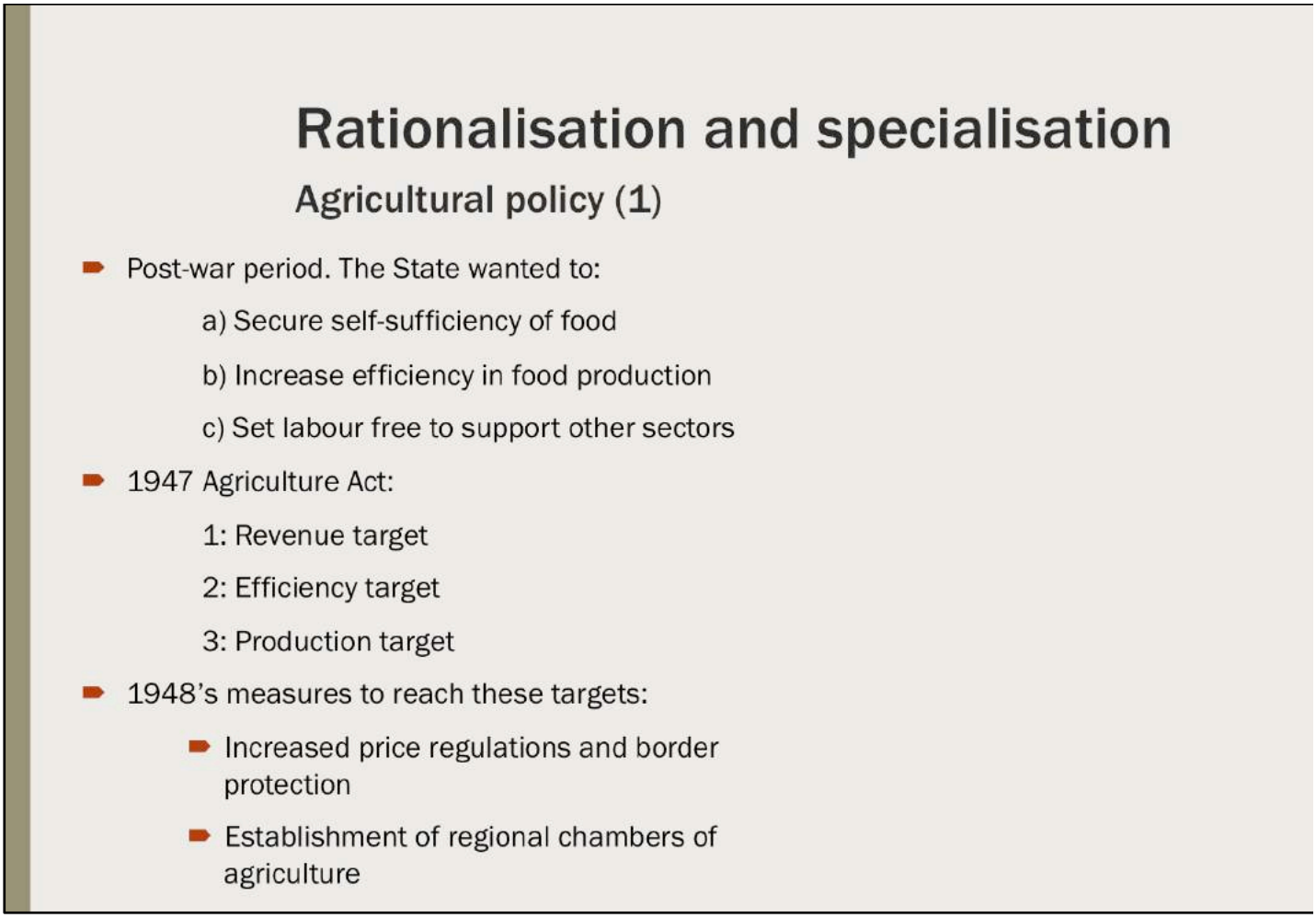
After World War II tractor sales took off seriously. This meant that the need for labour in agriculture decreased even further.



During the first half of the 20th century, crop cultivation and animal production were still present on most farms.

Technological development was rapid and the need for labour in agriculture drastically decreased in the middle of last century. Those who did not own land changed profession and went to industries which were growing rapidly and had a high demand for labour; there was a migration from farming communities to the new, booming industrial centres.

In the beginning of the 20th century there was still emigration from Sweden. However, over time such population flows diminished, so that by the middle of the 20th century, statistics showed that about 63,000 people had left Dalsland since 1850, that is, over the preceding century. To put this in context, the number of inhabitants in Dalsland today is around 50,000.



The important Agriculture Act of 1947 must be understood as part of a broader societal vision to create a welfare society where farming was to play an important role. After the Second World War, popular support for home food production was strong.

The Act consisted of three parts:
1. The revenue target – a family farm should deliver an income comparable to that of an industrial worker.
2. The efficiency target – small farms were to be put together to bigger, more economically sustainable units, and the production and the management were to be modernized.
3. The production target – self-sufficiency was to be secured at a national level.

The logic was that an increased efficiency and productivity would set labour currently working in the farming sector free to support industry development, while at the same time meeting the demand for self-sufficiency in food production. The remaining family farms should have reasonable incomes.

The measures used to reach the targets were increased price regulation and import controls. The establishment of new, regional chambers of agriculture (at the County level) aimed to increase productivity. These chambers gave advice to farmers on issues related to rationalisation and efficiency. The ongoing rationalisation process was, in addition, supported by loans and other forms of financial support, and even by the buying of whole farms. These farms were then sold to neighbours who the chambers assessed to be suitable buyers able to make the larger operation more rational and efficient.

Rationalisation and specialisation

Confidence in the future and vulnerability

- 1950's
  Rapid increase in productivity
- 1952
  The number of tractors in Sweden exceeds the number of horses
- Increase in subsoil drainage
- Specialisation of production
- Increased use and dependency of:
  - Fossil fuels
  - Chemical fertilizers
  - Pesticides
- 1974
  Indebtedness

Photo credit: https://digitaltmuseum.se/

During the 1950's, 60's and 70's a rapid technological development occurred, which also leads to a sharp increase in returns for those still active in farming. The confidence was high and there was great hope and a belief that continued technological development would overcome most obstacles.

At the same time, the emerging farming system becomes increasingly dependent on factors that could not be controlled at the farm level. Mechanization means dependence on fossil fuels as a power source. Increasing specialization means that more and more farms stop keeping animals and focus instead on plant cultivation. These farms now depend entirely on the availability of cheap fertilizers and pesticides. The remaining farms invest in subsoil drainage systems, new machines and buildings; many borrow large sums to finance such investments.

In 1974 the interest rates rise. This means that many younger, highly-leveraged farmers end up in a debt trap.

Rationalisation and specialisation

Authorities and governmental control

- 1950
  Prohibition of grazing in forests
- 1960
  State campaigns for forest plantation on arable land
- 1966
  The bounty on wolves is terminated
- 1979
  New Forestry Act: Forest owners are obliged to harvest low-productive forests (so called 5:3 forests)

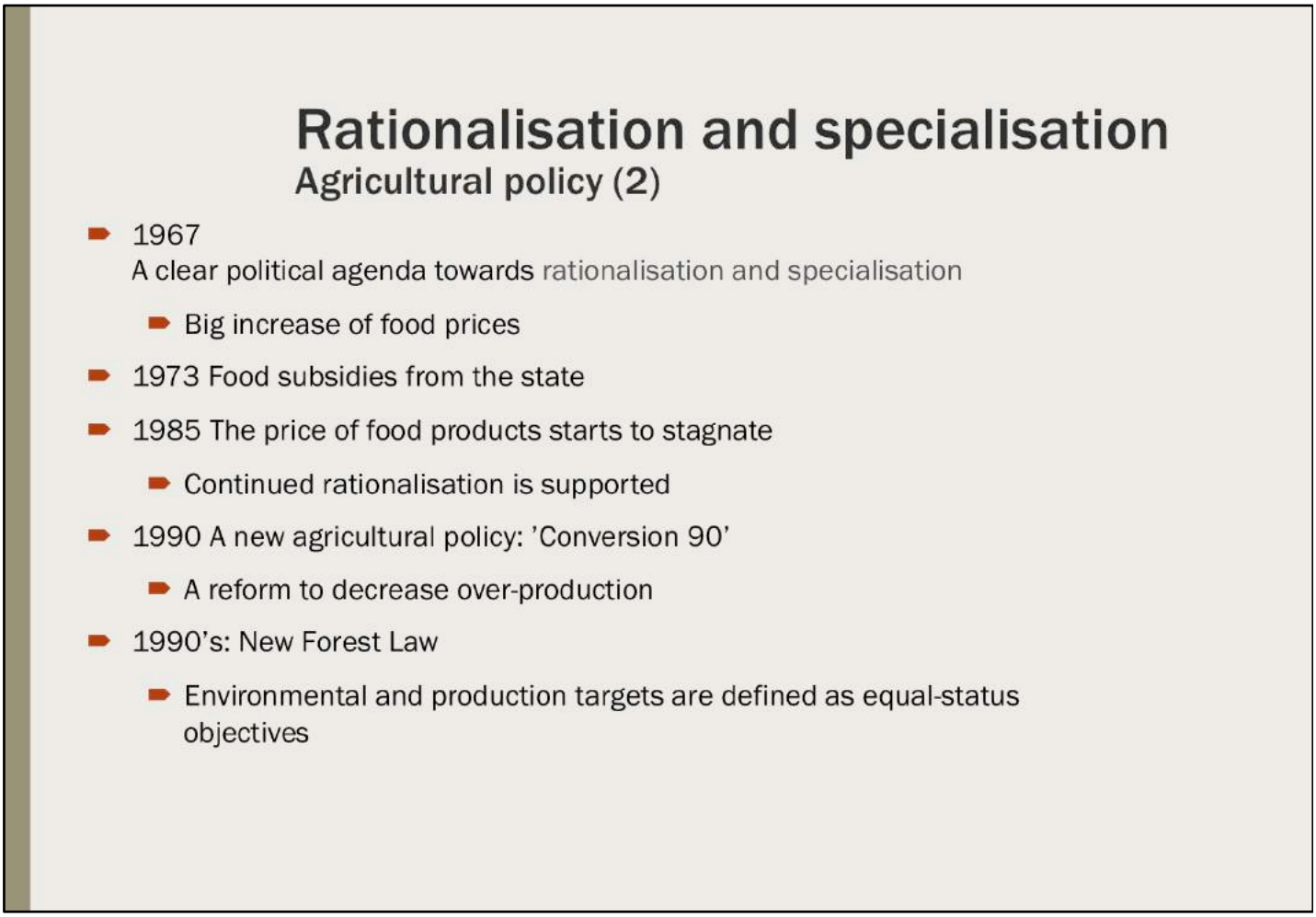
Photo credits: Lars Johansson

The State's high ambition to increase efficiency expressed itself clearly in legislation and government control. In 1950, the prohibition of forestry grazing took effect.

A State commission in 1960 concluded that 530,000 hectares arable land ought to be taken out of operation in the country. As a result forest plantation on arable land increased through state campaigns.

The 1979 Forestry Act entailed an obligation for landowners to harvest forests that were not considered to be in a productive state. A large part of these forests were former pastures or meadows with high biological values. The fields would be transformed into productive forests.

1966 saw a milestone for the protection of nature - the protection by law of the wolf. Until this time there had been a bounty on the wolf. Other great predators had previously been brought under the law's protection: bear in 1913, golden eagle in 1924 and lynx in 1928.



In 1967 the Parliament voted for a new agricultural policy in Sweden. Older farmers who volunteered to give up were granted transitional and severance pay. An interventionist prices policy would promote continued specialization and consolidation. The prices of agricultural products such as cereals, meat, milk, eggs were regulated by negotiation between agricultural and the consumer bodies under the supervision of the Board of Agriculture; this continued until 1990.

In the early 1970s, the price of food in shops increased by about 30% over a three-year period, leading Parliament to introduce food subsidies in 1973. The price increase for some basic food products was taken out of the national state budget and not directly through the price paid by consumers. This led to a drop in the price of milk and meat. During the late 1970's, environmental issues were also introduced in agricultural policy, but at the same time, it was decided in 1985 to continue rationalization policies.

In 1990 there was a sharp change in agricultural policy in the light of increased overproduction. Farmers would only be compensated for what the market demanded, not surplus production. In order to reduce overproduction and thus reduce the fall in prices, reform measures aimed at reducing production were introduced. This was labelled Conversion 90. The reform included, for example, support to change land use from the former price-supported crops to other uses, and the possibility of a so called milk pension for farmers who chose to finish milk production.

The 1990 Forestry Law states that environmental and production targets will weigh equally. But today, in 2017 and almost 30 years later, there is still uncertainty about how this should be interpreted in practice. Nevertheless, the decision shows a clear change in direction from previous legislation.

In a referendum in 1994, the Swedish people decided to join the EU. This changed agricultural policy again: “Conversion 90”, which meant that agriculture would eventually be liberalized and be competitive based on the pure free market, was erased after only three years. The EU's agricultural policy, CAP, meant a swing back to something similar to that what was in place in Sweden during the post-war period.

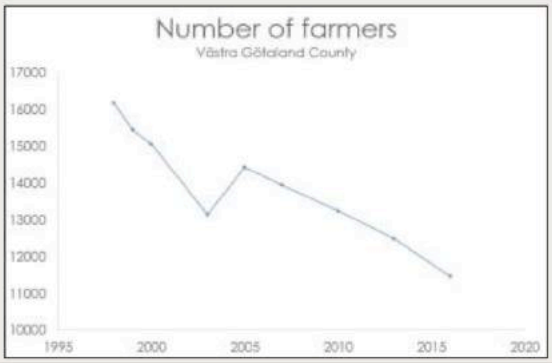
Farmers in general were divided, partly depending on their production direction, where in the country they were located, and farm size. On the other hand, the Swedish Farmers' Federation (LRF) was clear that it considered that the CAP could provide greater clarity, stability and long-term rules of play than has been the case in Sweden in recent decades.

Farmers in Dalsland are still split in their attitude towards the EU. There are disadvantages in that, for example, the Basic Payment reduces the amount of land on the market for active farmers, even for leasing, since it does not require the active use of land by claimants. Land has fallen out of production, resulting in a drop in food self-sufficiency; farmers have become subsidy-dependent. On the other hand, it is pointed out that environmental compensation and project funding have been important conditions for maintaining areas of natural pastures and that this would not have been easy to achieve in a deregulated, liberalized market.

Intensification and extensification

Lonely and vulnerable

- Early 21st century
  Continuing change in number and size of farms
- A lost generation
- 2010: 2% of the workforce are farmers
- Very few dairy farms left
- Growing number of lone workers



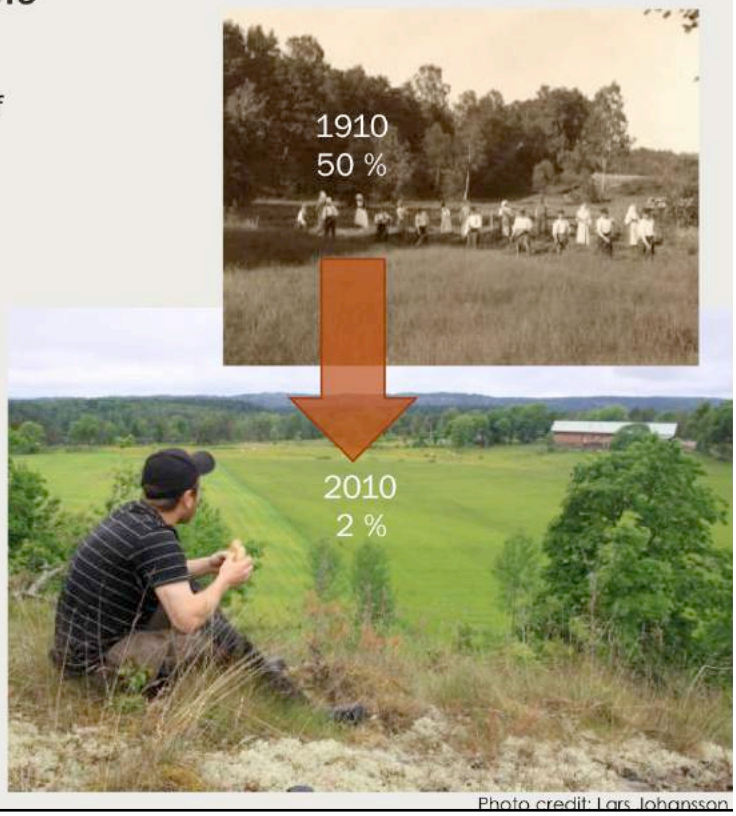


Photo credit: Lars Johansson

After the EU membership technological development and size rationalisation continues. In 2010 only 2% of the Swedish workforce are farmers. The share is a bit higher in Dalsland. One consequence is that most farmers spend their working day all alone.

Statistics from the County of Västra Götaland, where Dalsland is located, show that between 1998 and 2016 the amount of farmers has decreased by about 30%.

The photo illustrates four different land uses that are common in Dalsland at present. It also exemplifies how political, technical and economic forces lead to specific agricultural measures in the landscape.

Area A consists of fields that are at least semi-abandoned. Latterly it was arable land but historically would have been mown meadows. Now the land is not used for production at all. Nonetheless, a landowner can use it to claim Basic Payment.

Area B consists of spruce on former arable land, again an area previously used as a mown meadow. The landowner here chose to take the field out of agricultural production during “Conversion 90”. However, he still wanted production on the ground so he chose to plant spruce.

Area C was previously (semi-)abandoned (and again was once a meadow), but has now been purchased by a milk producer. In order to grow grass leys, he developed the drainage system, invested in subsoil drainage, closed over the open ditches and other uneven areas.

Area D was grazed until the late 60's but has now not been grazed for at least 40 years. The landowner bought the farm 20 years ago but lives somewhere else in Sweden. Earlier he used the farm for hunting and recreation. In recent years, however, large parts are heavily overgrown, and as a consequence it is not as easy to hunt anymore. The landowner now has a decision to make: how should he use the land in the future?

For farmers, conditions have changed during the past decades. Swedish agriculture has declined and farms are getting bigger and fewer. This is effecting the social situations at farms. For example farmers' networks of colleagues are getting thinner and the traditional family farm has in many cases been changed to one-man farms. Both mega-trends (i.e., global competitiveness, urbanization, specialization) as well as local development patterns (i.e., industrial restructuring, an aging population, re-investments in the local economy) affect rural development. The rural economy is in general shifting from food, feed and fibre (forest resources), to tourism, public service and payments for some ecosystem services. In a sparsely populated area like LA Dalsland most local actors are more or less involved in supporting the rural economy, although land use issues is strictly related to land ownership. This means that the involvement of both land owners, land users, planners and business developers has become more important in rural development over the last decade.

From a HNV-perspective the social situation of farmers are a crucial issues. If the social situation is not sustainable, young rural inhabitants do not want to continue farming and an already lonely working situation becomes even more lonely. Earlier research has categorized the social situation into two main problem areas: 1) Farmers sense that they have too little influence on decisions that affect their farm business e.g. they feel exposed to decisions and policies from the "society" at large and; 2) Farmers perceive an impoverished social situation with fewer contacts with other farmers and also with the consumers of their produce e.g. farmers experience loneliness (Nordström Källström, 2008). These problems have resulted in farmers retiring from farming and sometimes also leaving the countryside, but it is also in one way or another incorporated in their identities as farmers. Consequently, loneliness, vulnerability and being tied up can be regarded lying at heart of social sustainability among farmers in sparsely populated areas (Nitsch, 2009). This becomes an important driving force for rural development, and we argue that this sometimes is a much stronger force than for instance economic incentives.

Agricultural economy are dependent on both the farm business management as well as external food chains and market developments. Several studies have shown that structural development whereby farms expand and/or increase specialisation does not necessarily make production more efficient. A certain level of diversification activities on farms even helps them to buffer price shocks in production inputs, generate income from other activities, increase utilisation of under–used inputs, etc. (i.e., Manevska–Tasevska et al., 2014). Technological improvements are generally essential for increasing farm productivity and reducing production costs, but capital investments are not necessarily beneficial for farm performance, which has been shown among beef farms where higher capital did not improve farm efficiency.

Two main trends are today discussed in order to improve viability among farmers in this and other areas; farm management skills and social/institutional innovations. Focusing on how to manage existing, local resources more efficient has become more important than other strategies (growth in size, specialization or diversification). In addition, economic success of producers are believed to be linked to new partnership arrangements, strategic choice of production orientation (conventional vs. organic) and feeding regime (feed costs represent the highest share of the total costs of the livestock production).

The social and institutional innovations needed are strongly linked to new value chains and markets (but then for many different ecosystem services, not only food). Local, regional and state support (investments subsidies, advisory services, etc) is often directed toward such emerging structures. So developing new food/value chains and markets is today seen as a counter-force to the global economic driving force behind the so called agricultural treadmill.

Such economic driving forces (state support, local/regional investments programs and new private and public markets) will be especially important for HNV-farming the coming years, and most involve actors on all levels.

From having experienced a decline in legitimacy of agricultural policy during the 1980's and -90's, we now experience an increased interest in and commitment to agricultural policy. Several factors contributed to the decline earlier: discontent with food prices, changing public preferences with respect to farm income vis a vis environment, negative media, and increasing awareness among consumers and taxpayers about the impact of the policy. But things are now changing.

Politically the importance of being self-subsistent has become part of the sustainability discourse, as well as the role of agriculture (and forestry) for delivering ecosystem services to society in a bio-based economy. Sustainable land-use, international competitiveness and increased productivity are today three main goals to be achieved simultaneously. The recommendations from the state commission on the competitiveness of Swedish agriculture and national/regional food strategies are on its way and will influence agricultural production in the nearest future.

Payment for ecosystem services (PES) is an opportunity for HNV-farming in Dalsland, and the public sentiments with respect to agriculture is changing in a positive direction. But there still is a gap between the public polls that shows that consumers are in favor of local products and the actual market share of these products. This mismatch will not easily be changed in a situation where Swedish agricultural policy in general favors de-regulation and let market forces decide the direction of Swedish agriculture. Nevertheless, PES and local policies supporting the development of local markets are seen as a key to success.

The relevant actors are both on (inter)national, regional and local level, due to how different responsibilities are allocated in the Swedish policy system. The general view is that actors have a shared responsibility for supporting HNV-qualities. By developing new agricultural environmental schemes (AES) together with advisory services for market development, new solutions are supposed to emerge. To impact the policies and political driving forces affecting HNV in LA Dalsland we need to work on many arenas and constellations also outside the LA.

The complexity behind the different driving forces influence the farmers differently. In general we see four development strategies on farm level; 1) diversification, 2) adding value to products, 3) cost-reduction, and 4) planned exit.

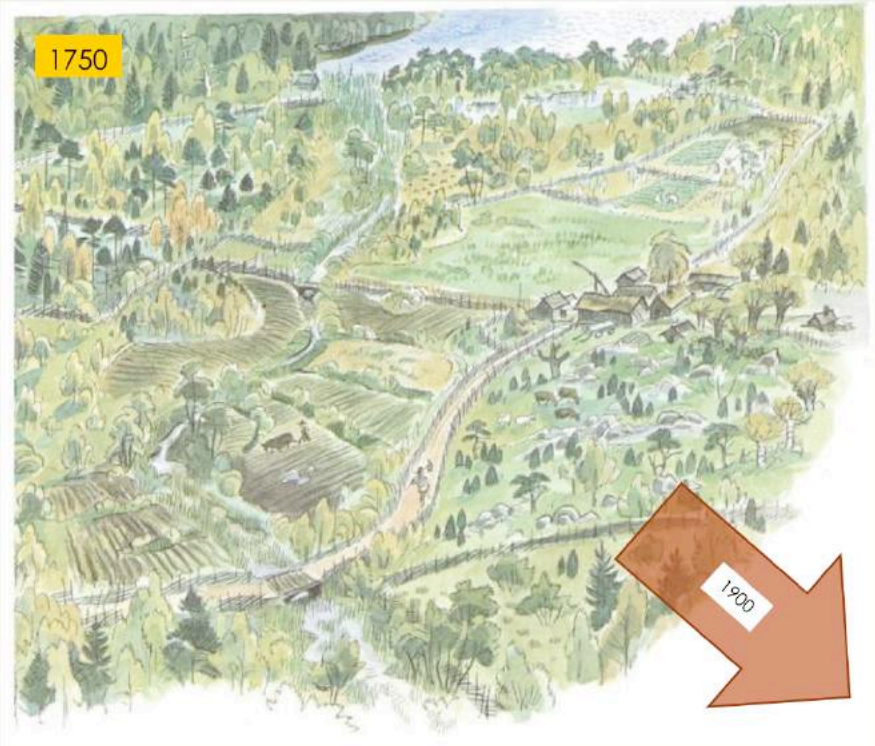
In the diversification-strategy (1) we see farmers whom use their existing resources in new ways (leasing or using machines in new ways, develop tourism activities, new food products, etc). Among the farmers who chose the strategy to add value to existing resources/products (2) we see them who process their own resources on farm level or create new concepts such as community supported agriculture. Of course, many farmers still belong to the third group, choosing to reduce costs in order to be more competitive (3). This can be done in different ways, but further specialisation, growth and developing farm management skills are the main measures taken. Finally, the so called planned exit-strategy (4) is commonly used when farmers have no relatives that wants to continue farming, which means that the farm is closed down but during a period that can take some decades.

Why farmers chose one or the other strategy has no simple answer, but is related to such aspects as local traditions, resource base, social context, economic incentives, market potentials, health situation, etc. It is about the farmer's values, attitudes, knowledge, competence, social norms, physical ability, existing infrastructure (on and outside the farm), etc.

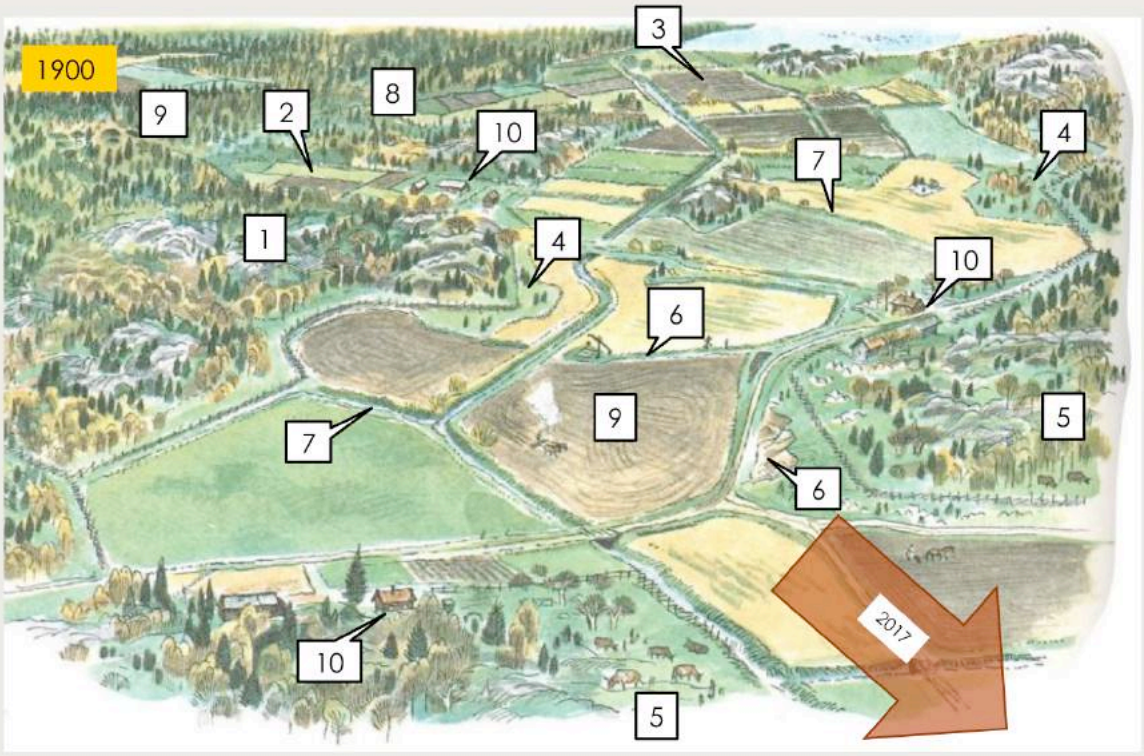
Nevertheless, the strategies chosen will impact the farming practice as well as the natural values created. To support HNV-farming means supporting farmers in different ways, depending where they are and where they are heading.

CONSEQUENCES

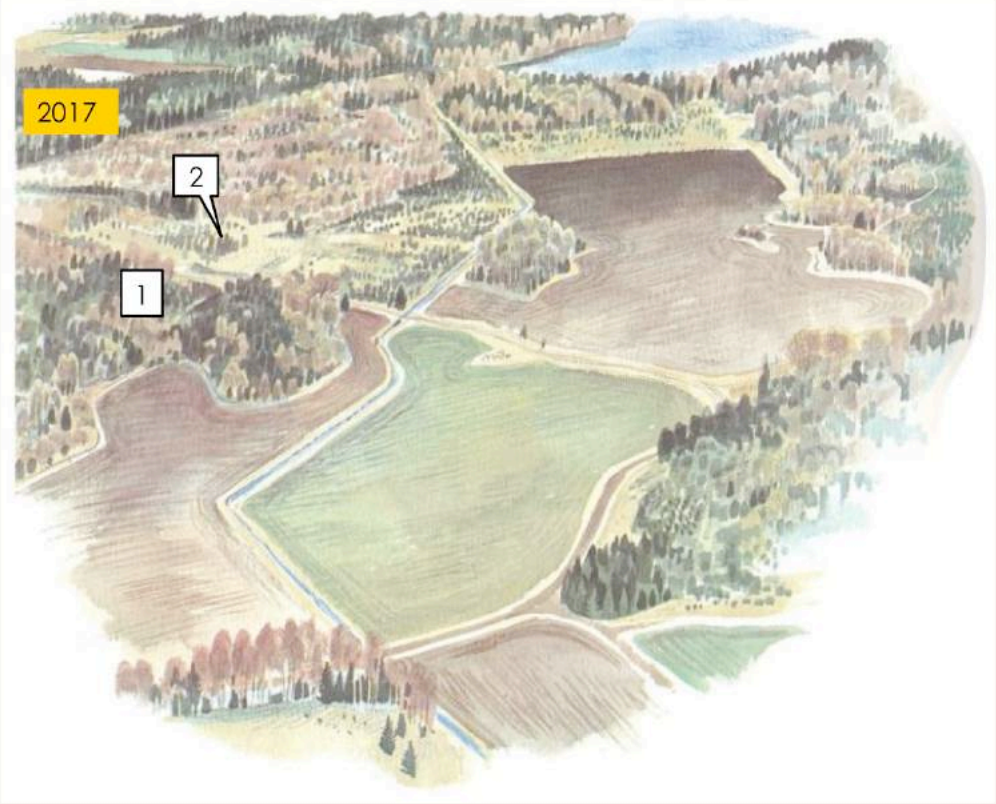
of the TRENDS and TIMELINE



When we look back on the natural landscape and how it was used earlier in history, there are many factors, trends and decisions along the timeline that have affected the current situation. Understanding these factors is of great importance if we are to manage the landscape in a way which we perceive is desirable and feasible, both now and in a sustainable future.

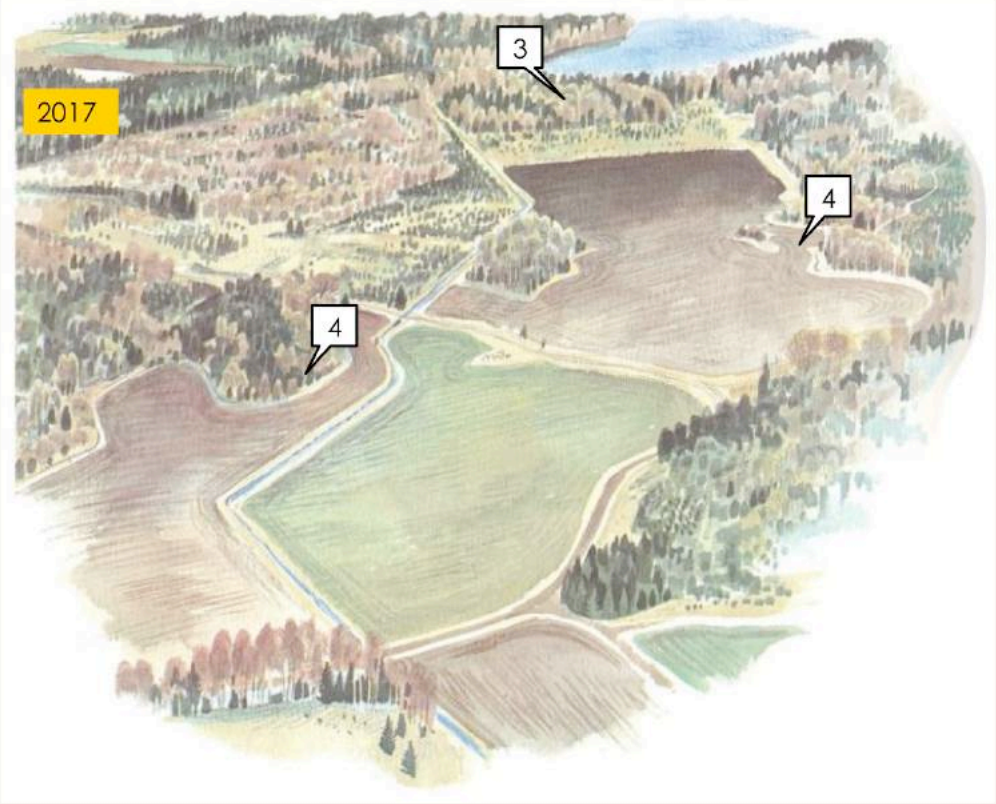


In the illustration places in the landscape are marked where obvious land use changes have taken place during the last century.



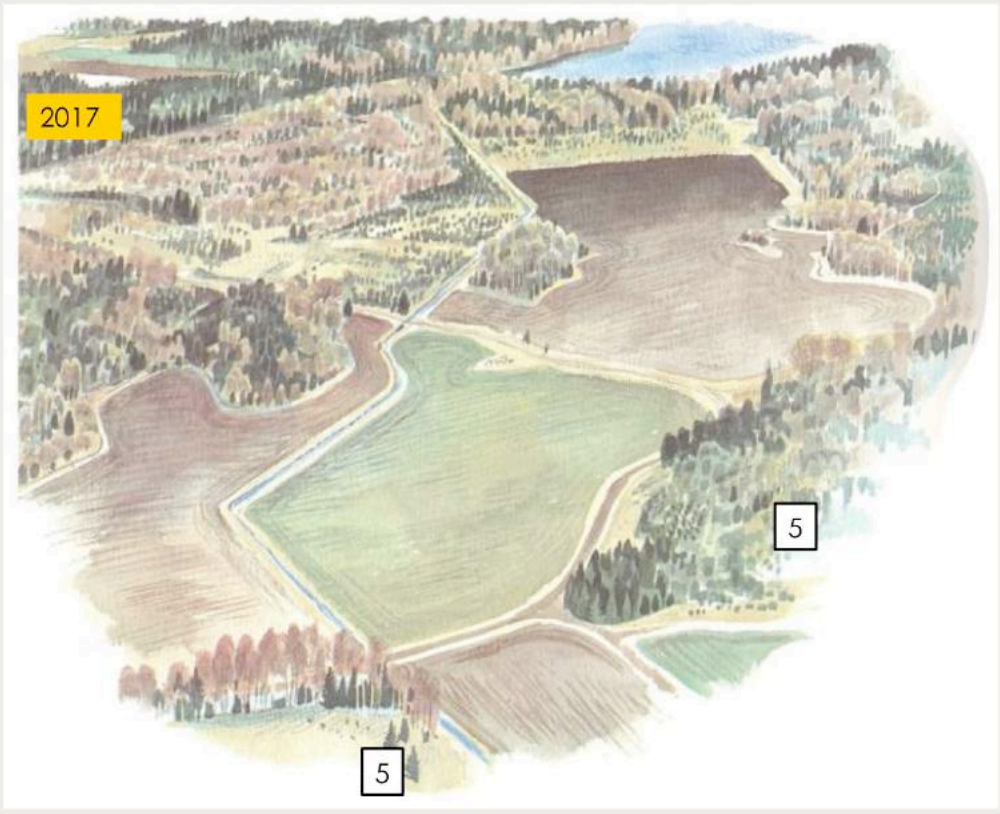
1) The decline of the outfields. The land consolidation reforms were a factor contributing to this by privatizing the commons which earlier were jointly managed and used. A more rational use of the infields, such as grass cultivation, made it easier and cheaper to harvest a larger amount of winter fodder for the animals on smaller areas than previously had been possible, not least on the mowed meadows. This opened up for more arable land and gave the opportunity to graze leys throughout the season. Increased demand for raw materials from the forests made it more attractive to invest in forest production. Finally, the prohibition against grazing on the outfields, introduced in 1950, contributed to the end of this land use era (farming system) on a vast majority of the farms in Dalsland.

2) Afforestation: In line with an increased focus on forest production, the Forest Board's establishment, legislation and state campaigns to promote forest regeneration, led to abandonment of pastures and forest plantation on the remaining outfields. Small fields, especially those who were difficult to use by being hilly or of irregular shape, were also planted.

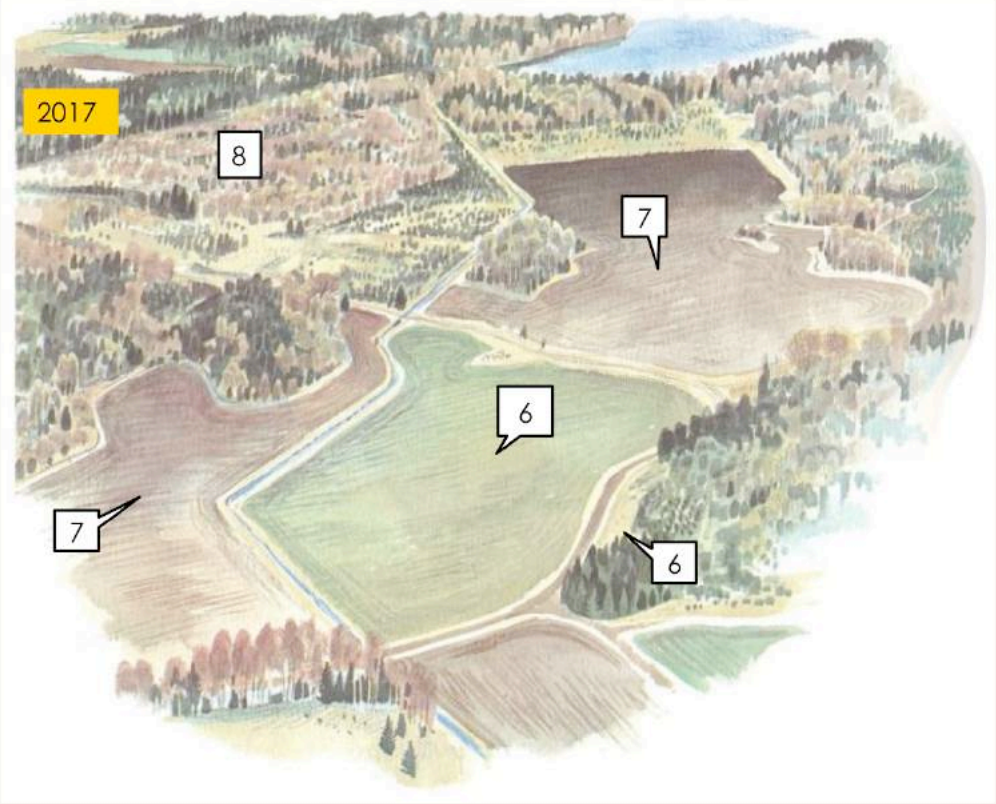


3) Arable land became forest. Much of the arable land which has been won through lake surface reduction projects could only be used for a shorter period. When the water level was lowered and when the soil was plowed, the carbon in the soils came into contact with oxygen in the air and disappeared to the atmosphere as carbon dioxide. As a consequence, the ground fell and quickly became too wet to function as arable land. These fields have over the past century often been owergrown spontaneously or planted.

4) Meadows become arable fields or forests. By the beginning of the 20th century most of the meadows had already been converted. However, in spite of this, there were significant areas of meadows spread in the landscape, often in places that were a little more difficult to transform into arable fields. Through access to modern machines, many of these areas have now been transformed into arable fields. The majority of the former meadows that have not been economically viable to transfer to arable fields have instead been reforested.



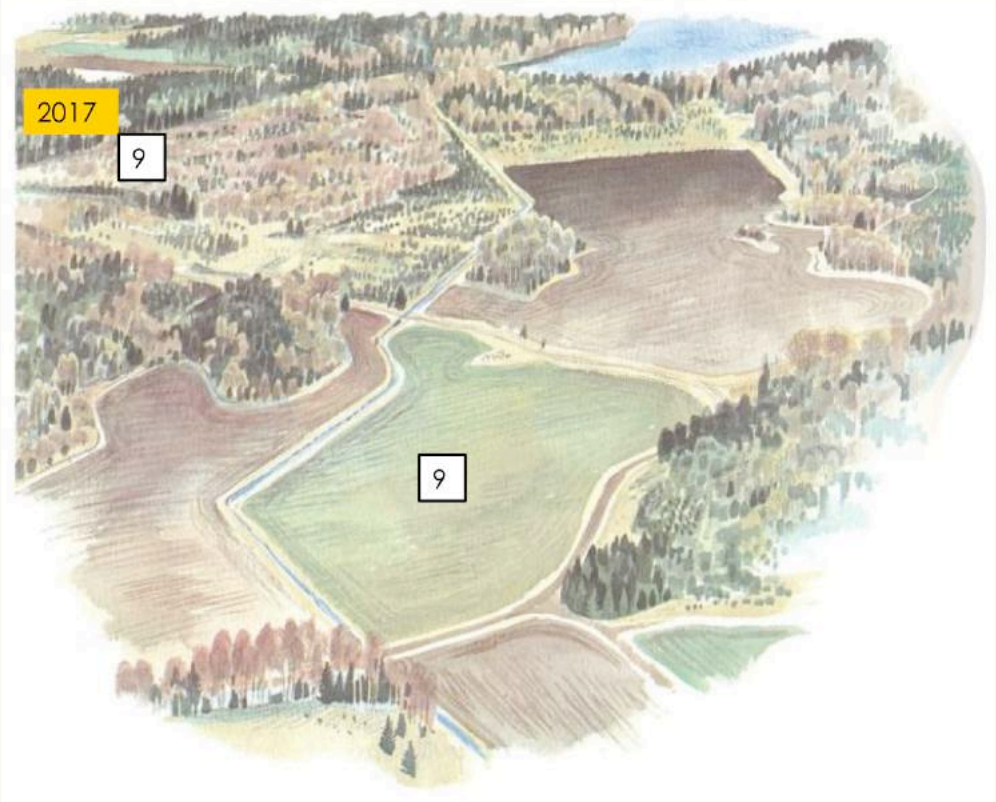
5) Pasture become forest. Pastures close to the farm were often seen as a resource by farmers even after the outfield grazing were prohibited. However, the signals from government during the rationalization period were that the natural pastures were a non-productive intermediate between arable field and forest. Farmers were therefore requested to "improve" the pastures by different means, for example fertilization, or to transform them into forest. In line with the logic of agricultural rationalization, the farms became fewer but larger. As it was both time-consuming and costly to keep animals in small pasture fields far from the farm and when the development also went towards specialization, the animals disappeared from many farms and pastures. Even in this situation, the authorities signaled that the land should actively be converted into productive forests. Overgrown fields were classified as non-productive and the landowner could be forced to clearcut the non-productive areas and to plant production forest instead. Nevertheless, the pastures not planted but just abandoned still have a great potential to regain high natural values if the grazing is resumed.



6) Less variation and longer distances between important biotopes. The structural rationalization process makes the landscape less varied and where the landscape objects change in their scale. The number of types of habitats in the landscape did not necessarily decrease in total, but the number of each type became fewer. For example, there were historically small gravel pits near the place where you needed such material. As a consequence, this type of environment was regularly created in close proximity to each other but in different historical ages. Similarly, to manage two fields meant more field edges, as compared to combined fields with a rational land consolidation.

7) Waterways and other water environments disappear. Subsoil drainage and culverts created possibilities for a more rational land use. At the same time, many important habitats were lost which affected a large number of organisms. The waterways ability to slow down sediment transport, dampen high flow and absorb nutrients decreases.

8) Less varied forest environment. New policies and principles of forest management, such as clear cutting, yielded significantly higher returns for the forest owners. The forest environment developed into structure where the trees had the same age, where the forest were more dense, more shady and also colder. In addition, the variation of tree species decreased. On the positive side is that ash recycling and forest fertilization do not yet take place to a larger extent.

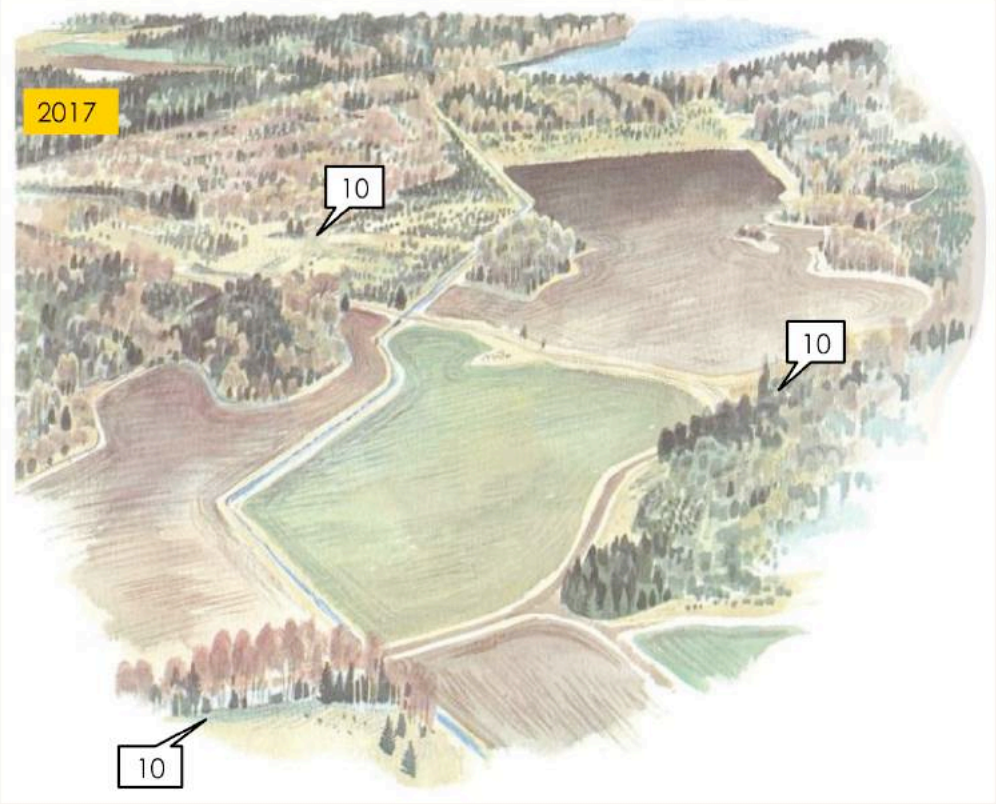


9) Use of chemicals

Our ability to use the landscape in a more intensive way with the help of technology and chemistry, led to a significant increase in returns. But in the 1970s, 80s and 90s, the environmental impact of our new way of using the landscape became obvious. Public debates on the use of Hormoslyr and other chemicals in forestry, crop and plant production became frequent.

Hormoslyr, containing dioxin, was banned in 1977 and pesticides containing DDT and mercury were phased out. During the 1980s and 1990s, efforts were made by society and agriculture to reduce chemical use and to find products with less risk of harmful effects on the environment.

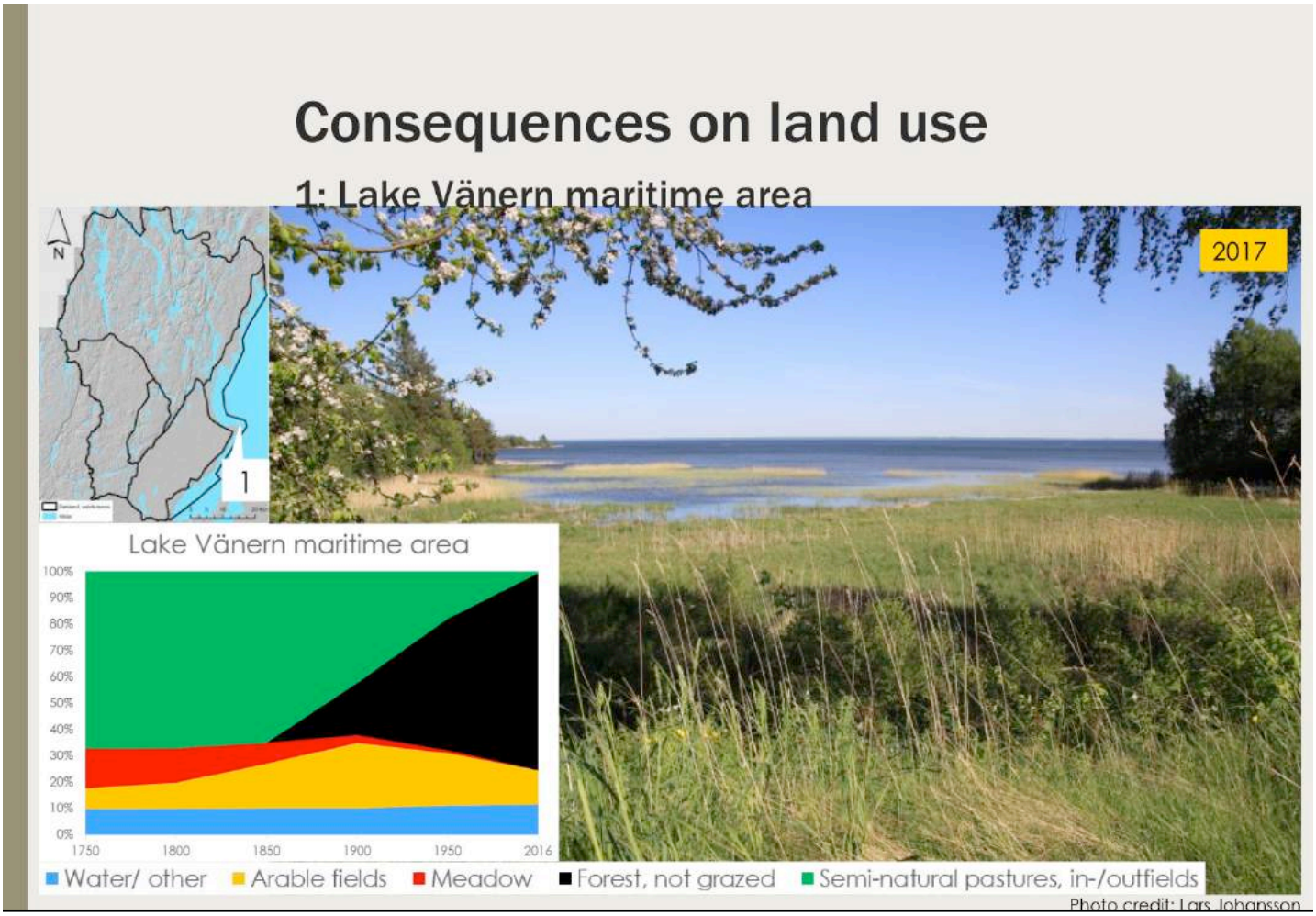
Also our knowledge of benefits and risks increases over time. We are becoming more and more skilled at retaining nutrients and chemicals in the fields and minimizing the risk of spreading it too, for example, negatively affecting the watercourses. At the same time, the insight how difficult it is to predict and manage negative long-term effects of an increased use of chemicals is also growing.



10) Fewer neighbours and colleagues.

The effect of rationalization in agriculture, an increased labour demand in industry, population growth and emigration resulted in that a lower proportion of the generations that grew up continued working in agriculture. The proportion of the population working in agriculture had fallen to from about 80% in early 1800 to about 2% nowadays.

Many farms were abandoned, traditional communities cease to exist and local, social capital is eroding.



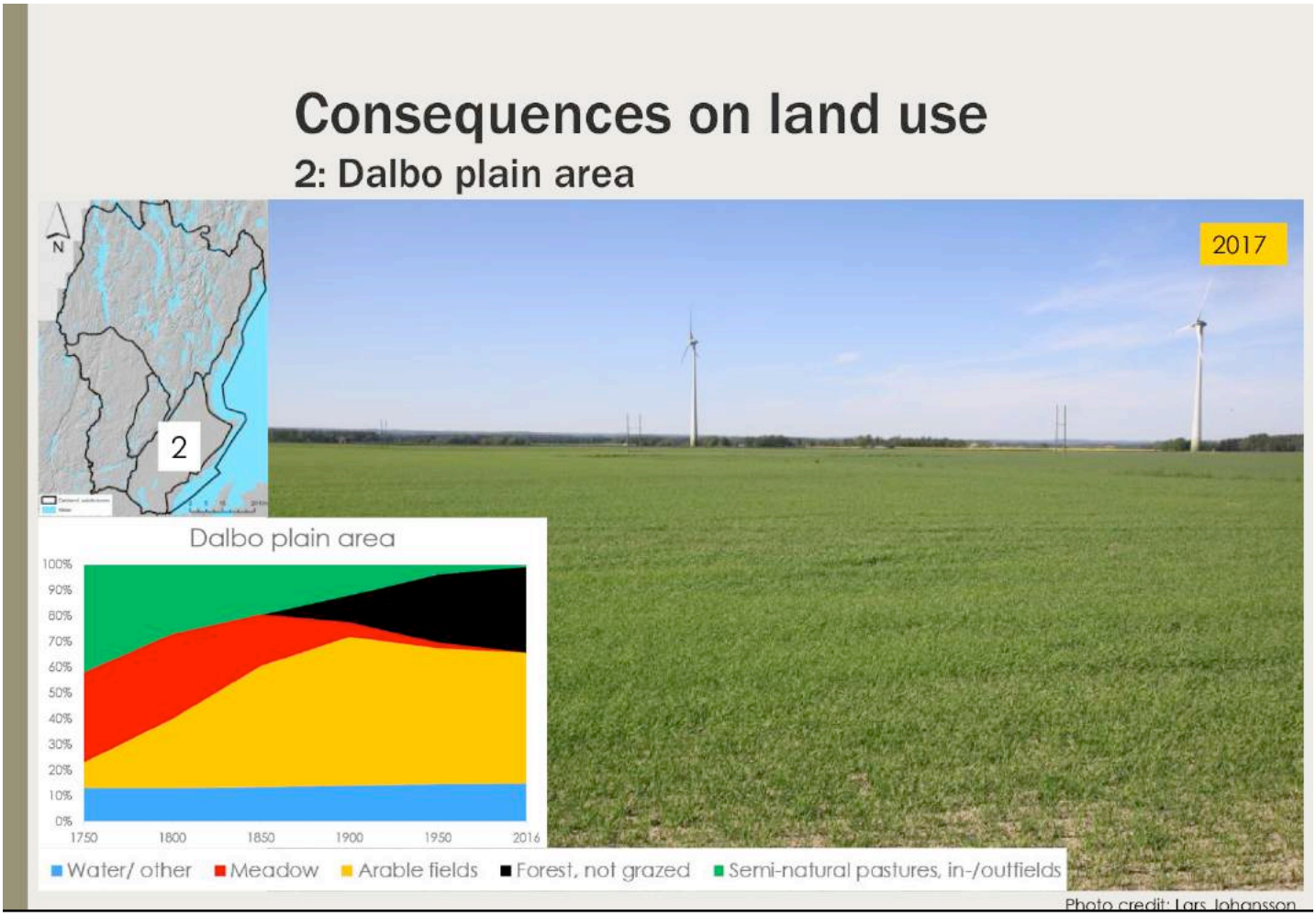
1: Lake Vänern maritime area (170 km^2)

The diagram in this slide (and the following) shows how the land use have changed in the subdivision area since 1750.

Data from 2016 come from the Swedish Board of Agriculture. Data from 1890 come from a GIS-analysis of 1890 years economical map (Häradskartan). Data from the early 19th century come from a GIS-analysis of a farm or field map which we define as representative from a specific physical geography subdivision. Data for additional years is based on different written sources and an estimation of trends in the area.

Our interpretation is that the Lake Vänern maritime area historically mainly has been outfields belonging to farms in the nearby Dalbo plain area. These outfields is today transformed into productive forests.

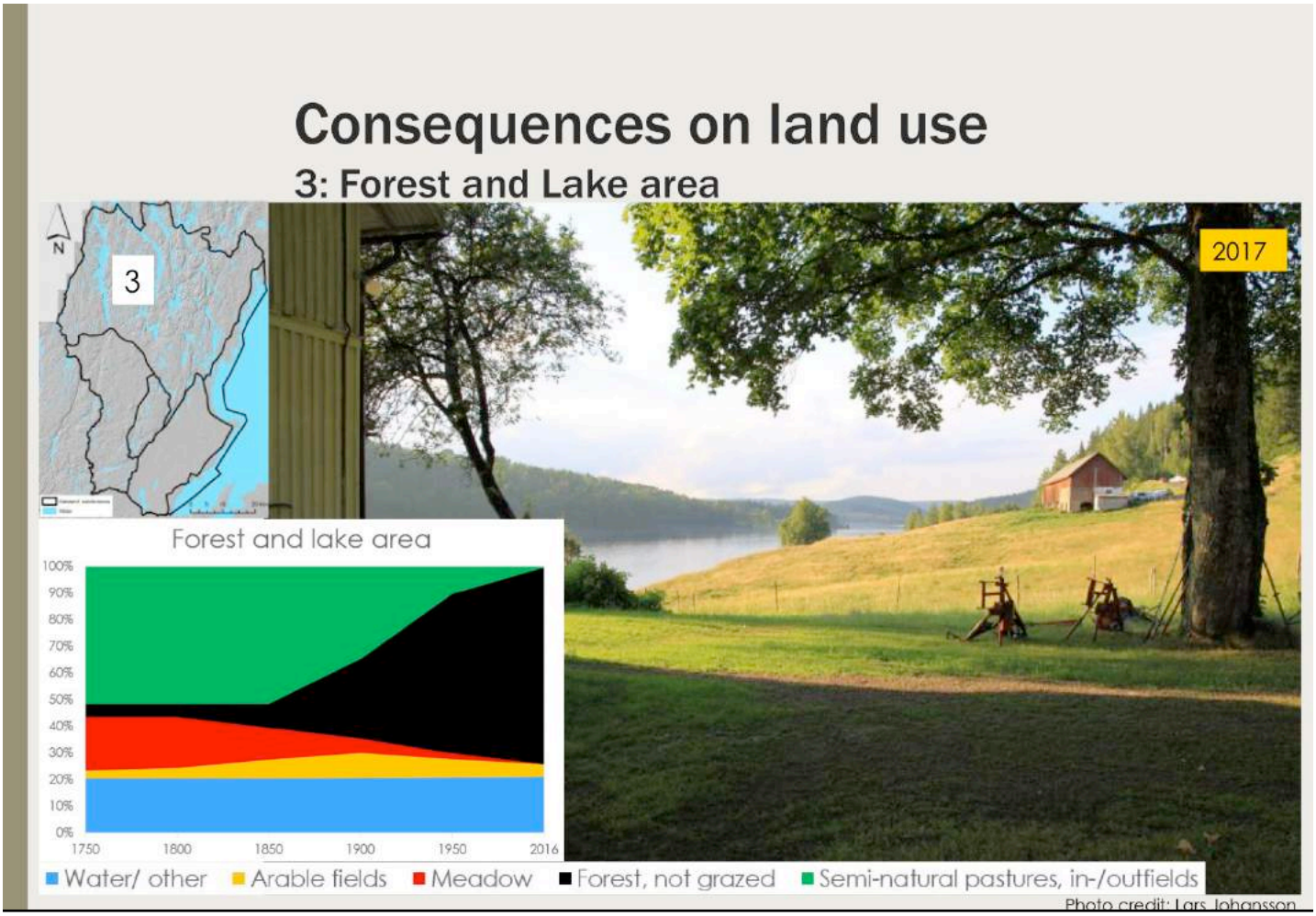
Habitats still common in the area, and which have a potential to regain HNV-qualities, are the water meadows as the one on the photo.



2: Dalbo plain area (640 km^2)

This area has historically had a high share of meadows. During the 19th and 20th-century the vast majority of these areas, including the outfields, were converted into arable fields. Today it is one of the most productive and intense production areas for cereals in Sweden. Drainage systems and lowering the water level were some measures taken and which enabled a radical shift in land use. There was also a transition from commons to privately owned and managed areas.

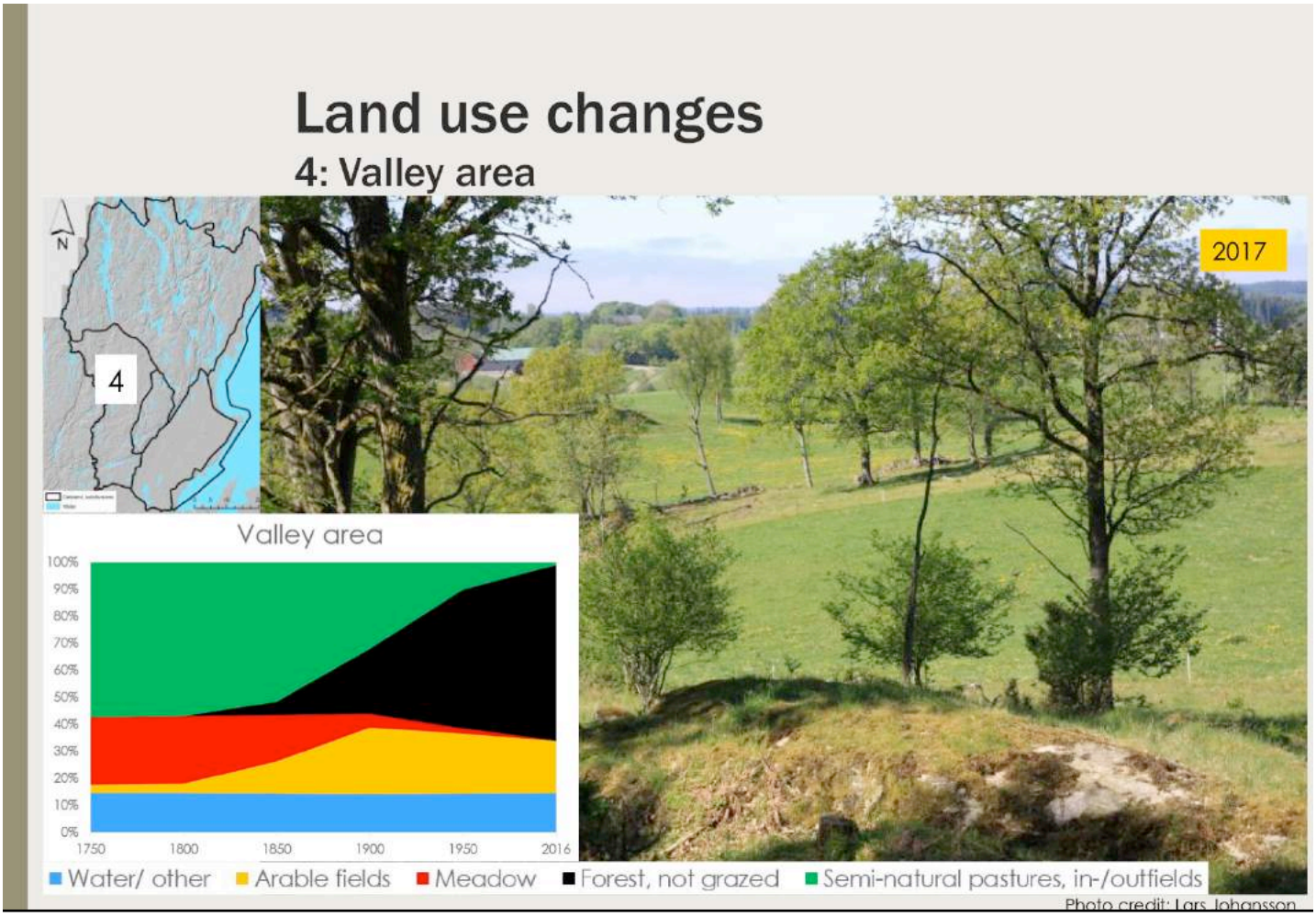
Fragments of meadows and pastures are still scattered in the landscape. In the southern part of this area there are some lowland lakes and mashes with HNV-qualities, especially from an ornithological perspective. There are good potentials to restore and increase these areas in the future.



3: Forest and Lake area (2300 km^2)

This is a large, sparsely populated area with many lakes and widespread forests. In this area were historically large areas grazed as outfields. Most of these areas are now so called productive forests.

A large part of the area has a bedrock of basic volcanic and sedimentary rocks, creating preconditions for a very rich flora. The HNV-qualities are many in the areas where farming is still active. Resumed, traditional management on areas with a history of meadows and pastures will create an increase in HNV-qualities.

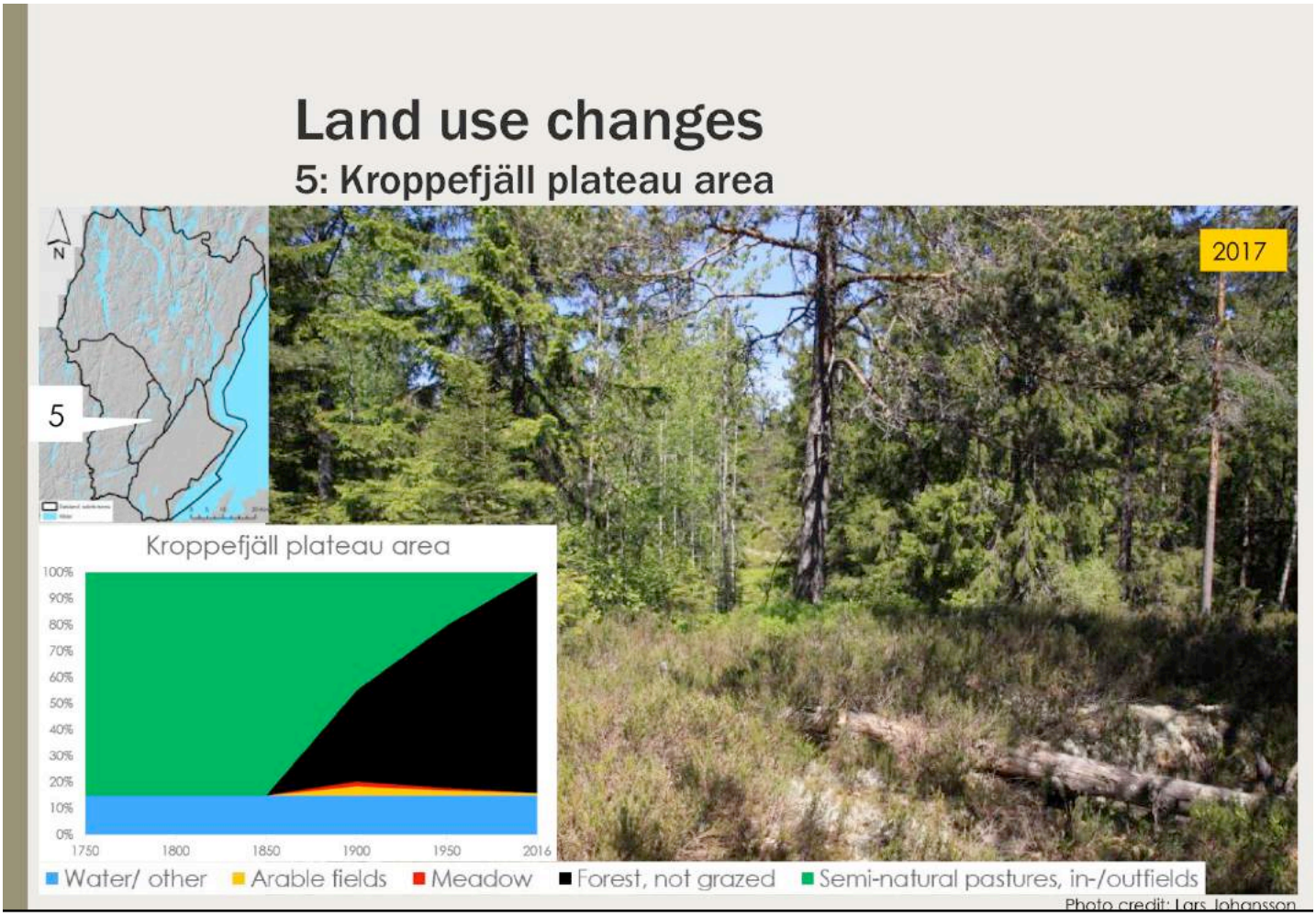


4: Valley area (750 km^2)

Much of the former pastures and meadows are today arable fields or production forests. The eastern part of this area has elements of basic volcanic and sedimentary rocks and limerich soils.

The area is hilly and diverse which had the effect that some areas which were difficult to reach or to cultivate never were converted to arable fields. Some of these remnants are still grazed. Land which is not grazed anymore, but which neither has been afforested, are possible to find on many places today.

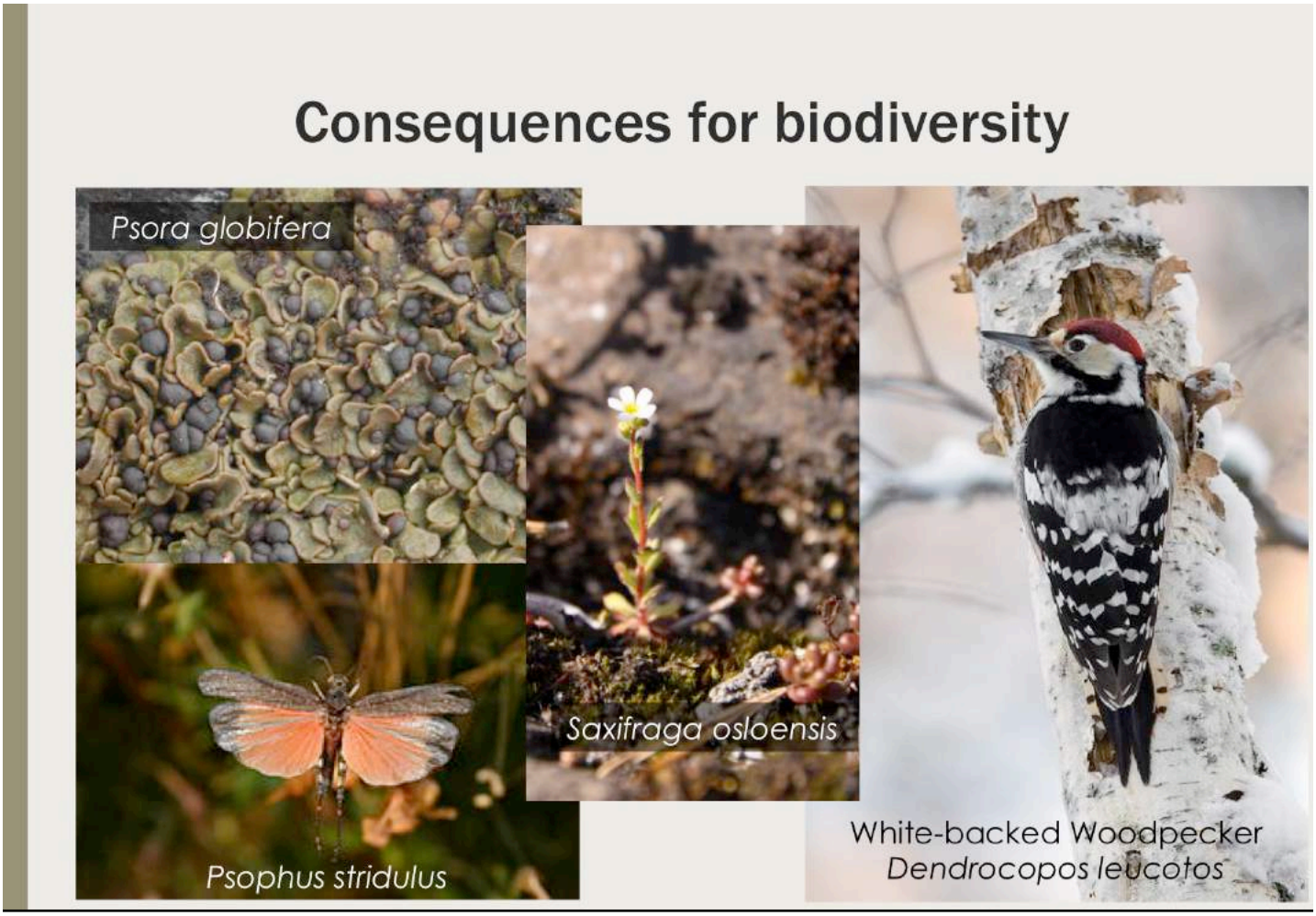
A characteristic feature of the area is that it is relatively rich of old, large deciduous trees. These are often located on former meadows. The photo illustrates such a landscape, where grazing recently has been resumed with clear and positive HNV-effects.



5: Kroppefjäll plateau area (190 km^2)

Until the mid 19th century this whole area was used as a large outfield for nearby farms in the Valley area, the Dalbo plain area and the Lake and forest area. During the end of the 19th century, when population was rising and there were an increased resource deficit, new settlements were established in the area as well as some cultivation of new land.

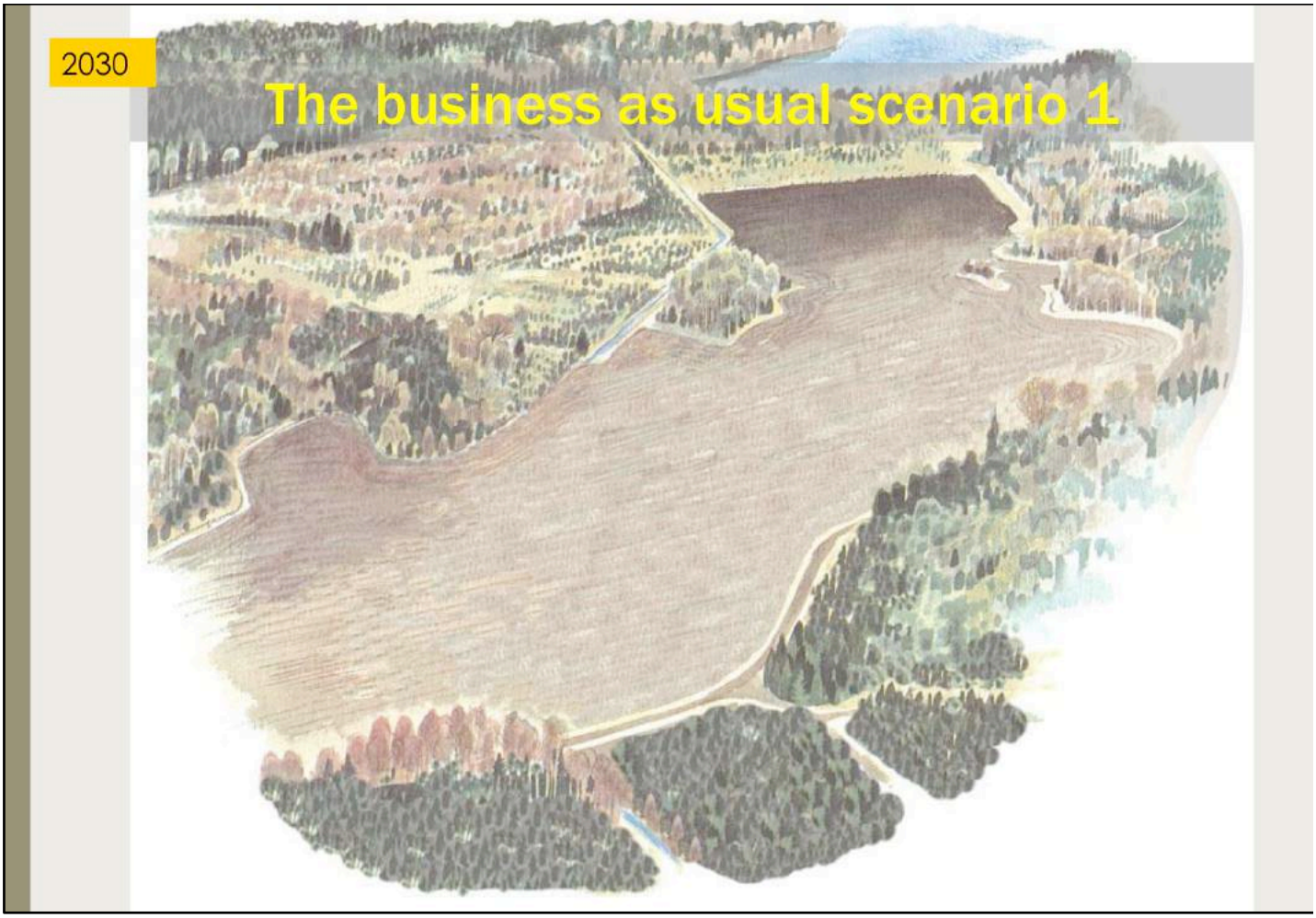
Today most of the area is forest. The biggest HNV-potential lies in the former outfields which were spontaneously overgrown and which not yet has been transformed into more productive forest systems.



The trends and activities described on the previous pages have changed the landscape dramatically. In addition to these overall landscape changes, each species is affected by other, species-specific factors, such as sensitivity to climate change or new hunting methods. The many chemicals which are today diffused almost everywhere might also affect each species in different way and with long term consequences that are far from clear. Certainly are there additional factors which we may not have thought of or discovered yet.

Regardless of the complexity of cause and effect for specific species, land use is a factor that is of major importance for most organisms and species. The measures implemented to be able to produce food and forest raw materials in a cost-effective way might have been successful from a production perspective, but at the same time creating a less diverse landscape.

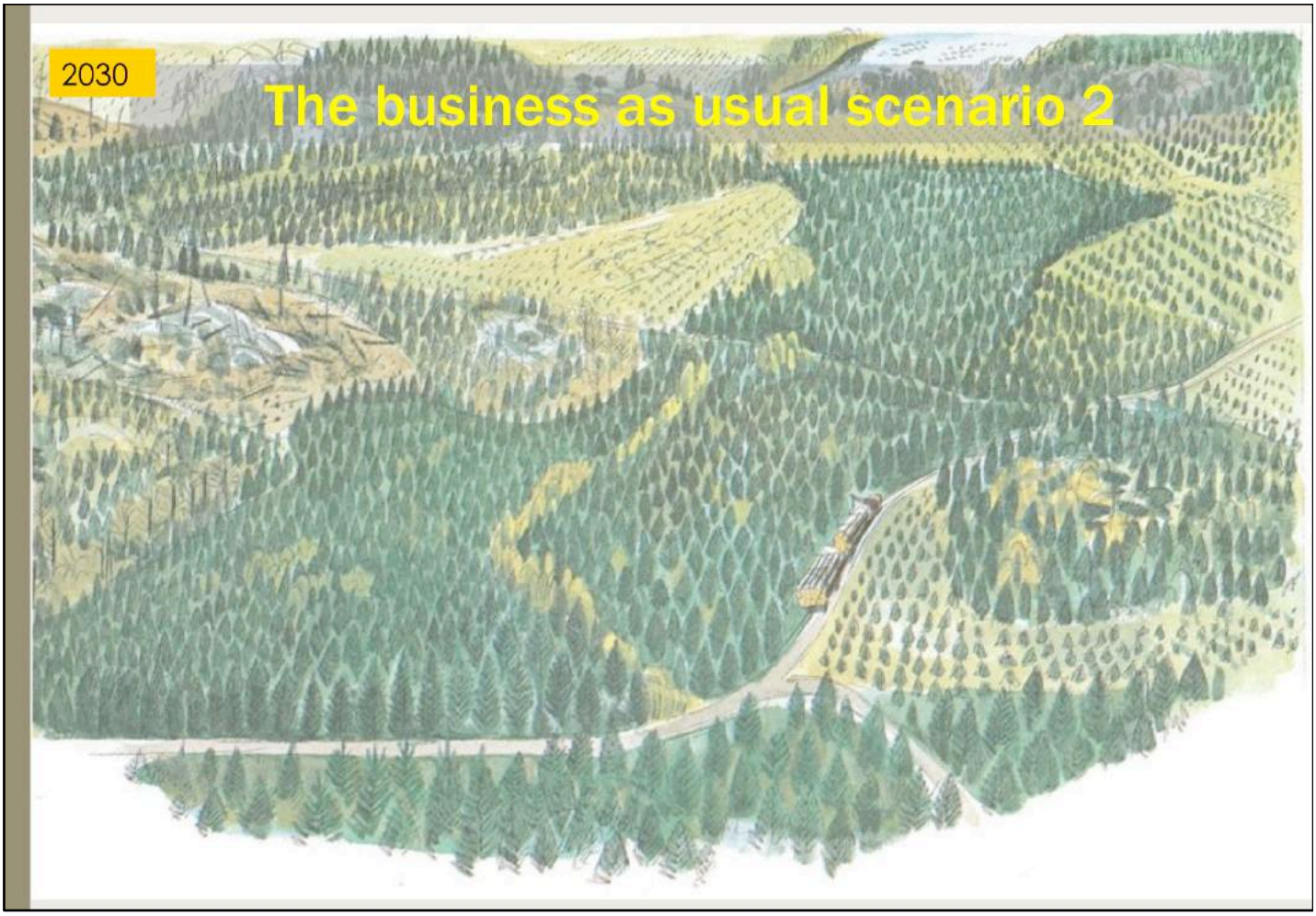
The photos show species that have been sharply reduced in Dalsland since the beginning of the 20th century, and where an important explanation is changing habitats. At the same time, Dalsland is one of the few places in Sweden where these species remain at all. These species can therefore be said to be one of Dalsland's unique responsibilities.



In this scenario, we assume that most factors affecting decisions in agriculture and forestry will continue and change the landscape according to similar patterns as they do today. We also assume that there will be no joint effort from different actors to influence or counteract these trends, but instead try to adapt to current trends. We assume that technology development on the machine side continues at a high pace. Finally, we assume that despite heavy pressure on prices, there will continue to be large, growing and specialized crop producing farms or animal farms in the area. We believe that some farms will continue to stay small, but that the owners then will work outside the farm.

If these assumptions are correct, we believe that most decisions that will be made about measures in forestry or in agriculture will resemble those taken earlier. This means that it will continue to be important to reduce the time and cost of land management, increasing efficiency in all steps of the production process, at least for those earning their main income from agriculture.

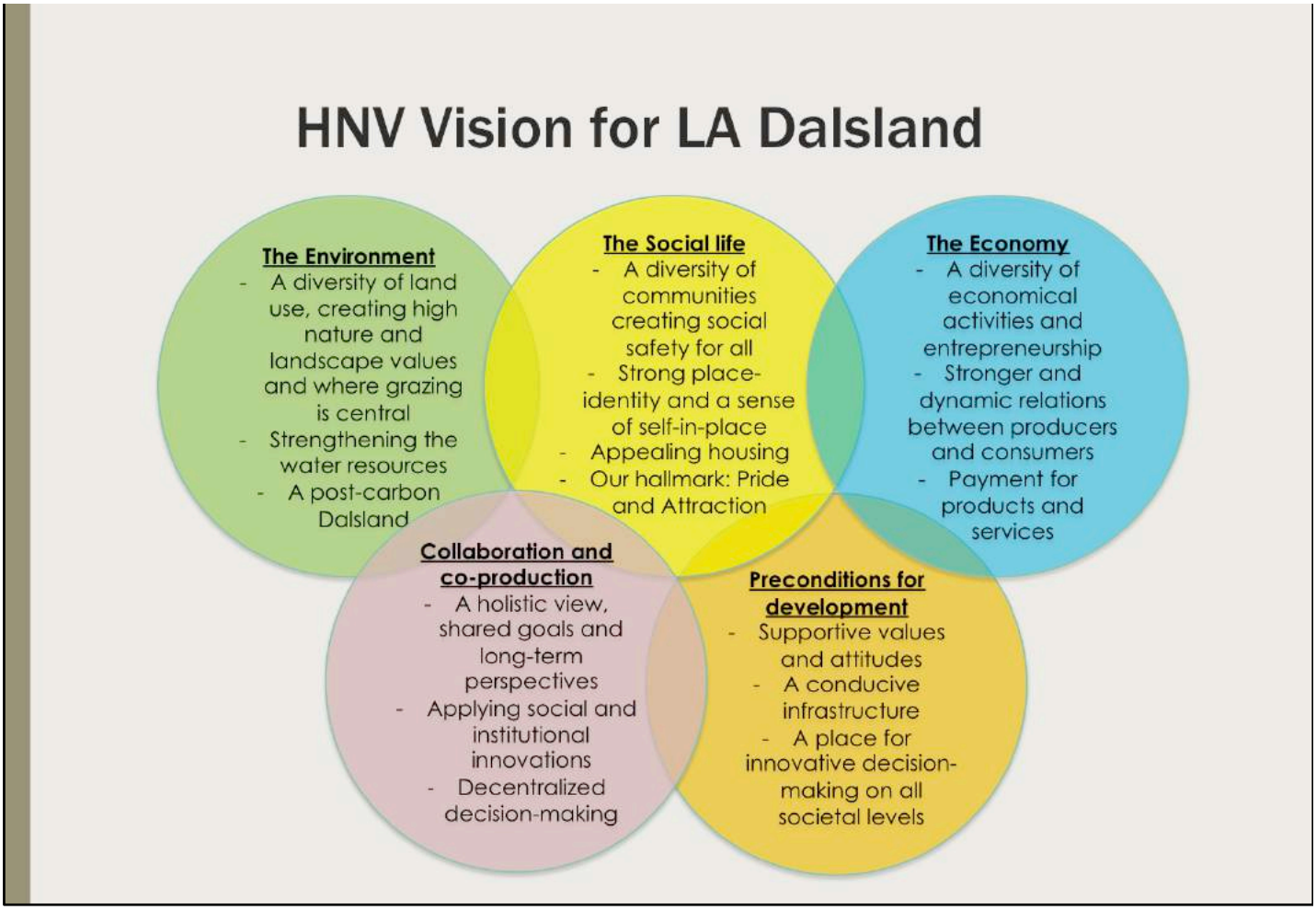
Our assessment is that smaller fields will be too costly to grow cereals or to fence and manage cattle on. They will therefore largely be converted into forests. In the fields where it is considered possible to continue with crop production, there will be an ongoing pressure on further rationalization. Biotopes, as the remaining open ditches and older farm routes, will decrease further. The landscape's potential to deliver ecosystem services such as recreation, hunting, and biodiversity will fall.



This scenario is based on similar conditions and trends as in scenario 1. What differs from scenario 1 is that landowners estimate that it is not possible to have an acceptable return of additional investments which would make the arable land possible to use more rationally. Simultaneously, the actors within the forestry sector are assumed to have similar raw material needs as today.

As a consequence all arable land is re-forested, mainly with spruce. The owners do not live on the site and have no other expectations on the forest than to provide economic returns.

The potential of the landscape as a place for biodiversity will fall, both in comparison with the present and also compared with scenario 1. Also, the potential of the landscape as a place of recreation and hunting compared to the present will fall. If the same also applies when comparing with scenario 1 will depend on the type of recreation or hunting involved.

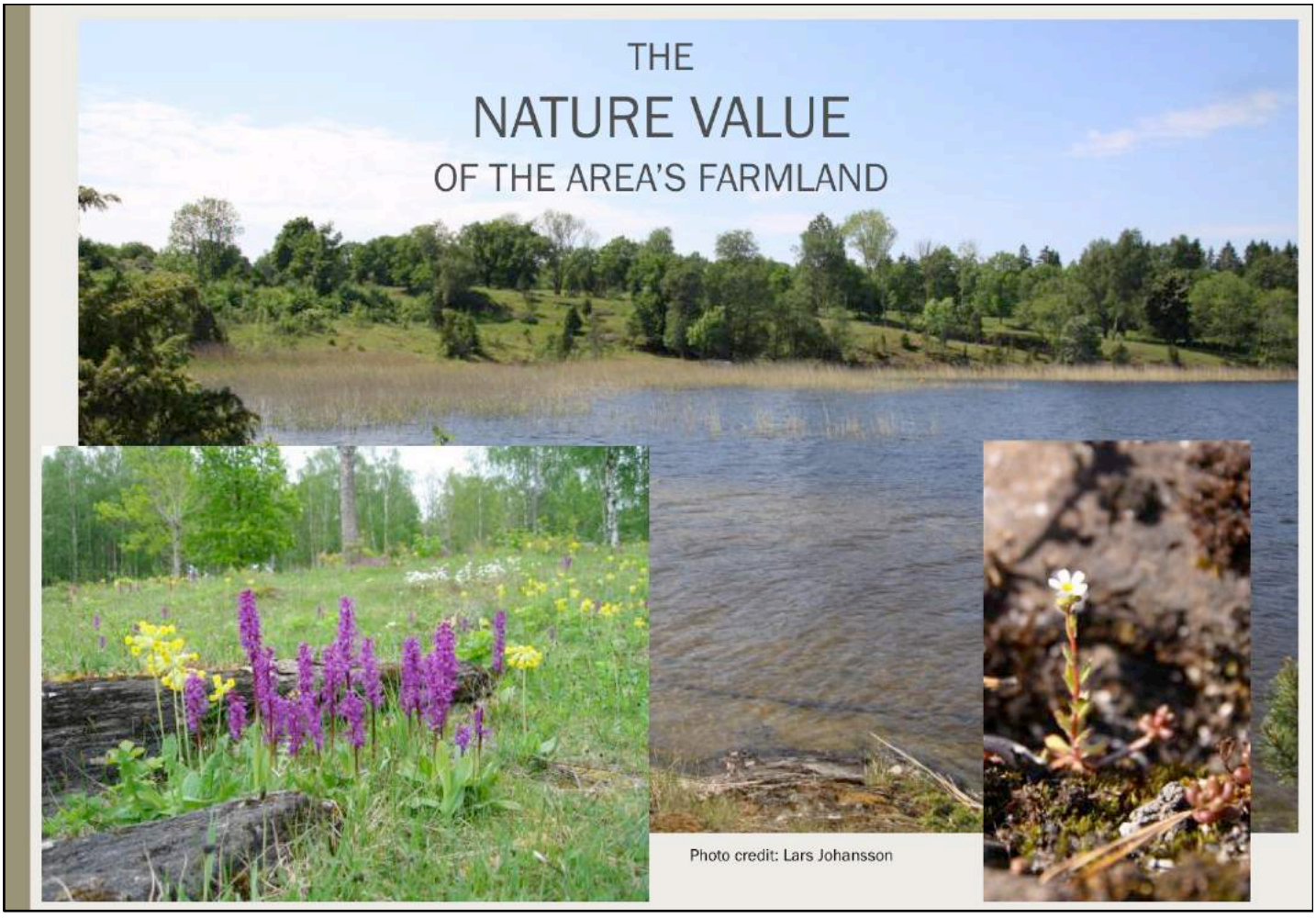


During the winter and spring of 2017 seven workshops were carried out as part of the HNV-LINK project in Dalsland, in which fifty different individuals took part. At the meetings, the participants have worked with three main issues:

1) What does the historical timeline contain in Dalsland?
2) Where do we want to be in the future? What is our HNV vision?
3) How do we get there? What types of ideas and innovations do we see as desirable? What innovations do we know about? What solutions can we work for?

The figure summarizes the HNV vision that crystallized during spring's meetings. All five areas should be seen as a whole and as closely linked. Each area is a prerequisite for achieving goals in other areas.

At the meetings, it was found that resumption of the active management of HNV areas should be a concrete measure to reach the vision.



Dalsland's calcareous flatrocks are an unique and characteristic habitat. Similar habitats exist on other places in Sweden, but here the mix of shale and pure limestone creates a much richer assembly of minerals. Together with a wet and mild climate, this creates an unique environment.

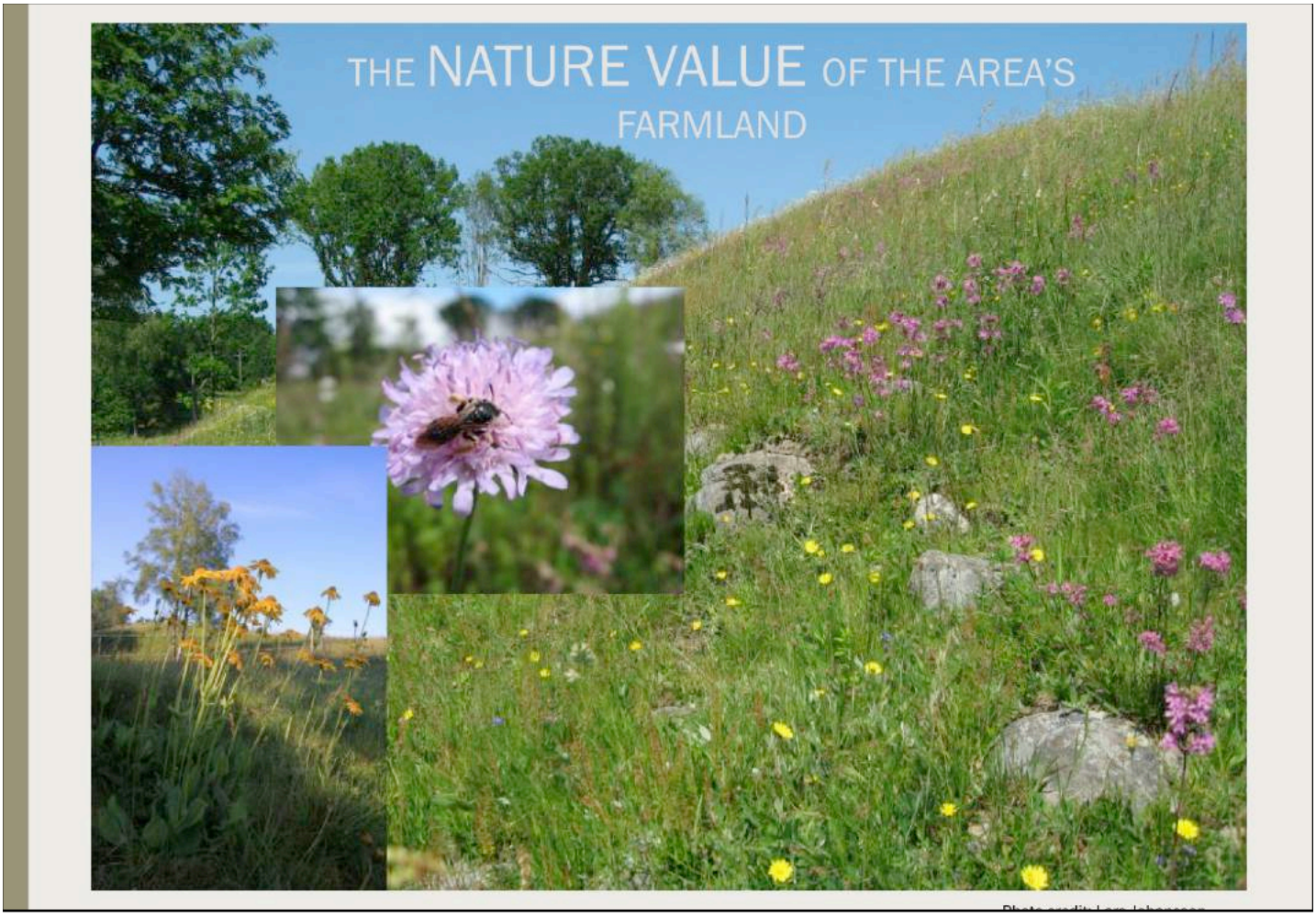
This lime-rich rock habitat has a very rich flora of vascular plants, lichens and insects. Species like *Saxifraga osloensis* and *Psora globifera* are strongly connected to this habitat. All locations for *Psora globifera* (apart from an old record from northern Sweden) is within calcareous flatrocks in Dalsland.

The worlds population of *Saxifraga osloensis* is in Sweden and Norway, and with its main natural range in Sweden.

Calcareous flatrocks in this area are easily eroded, producing lime-rich soils. Earlier in history most of these lime-rich schist areas were managed as grasslands or mown meadows. Grazing and the trampling of hooves exposed large areas of the bedrock to the action of sun, wind and rain. But when grazing disappeared in many areas, moss, grass and a growing layer of litter took over the open limestone pavements and changed the habitat.

Government-supported action programmes have been implemented for both the calcareous flatrocks and for *Saxifraga osloensis*.

The relevant Habitats Directive Annex 1 biotopes are:
6280 Nordic alvar and precambrian calcareous flatrocks
6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates
6270 Fennoscandian lowland species-rich dry to mesic grasslands



In places in the landscape without much limestone there are environments like this, where a long history and continuity of mowing or grazing has created plant communities with *Arnica montana* (small photo on the lower left), *Hypochaeris maculata*, *Succisa pratensis* and *Scorzonera humilis* as typical species. *Andrena hattorfiana*, a solitary bee, is shown on the second smaller photo.

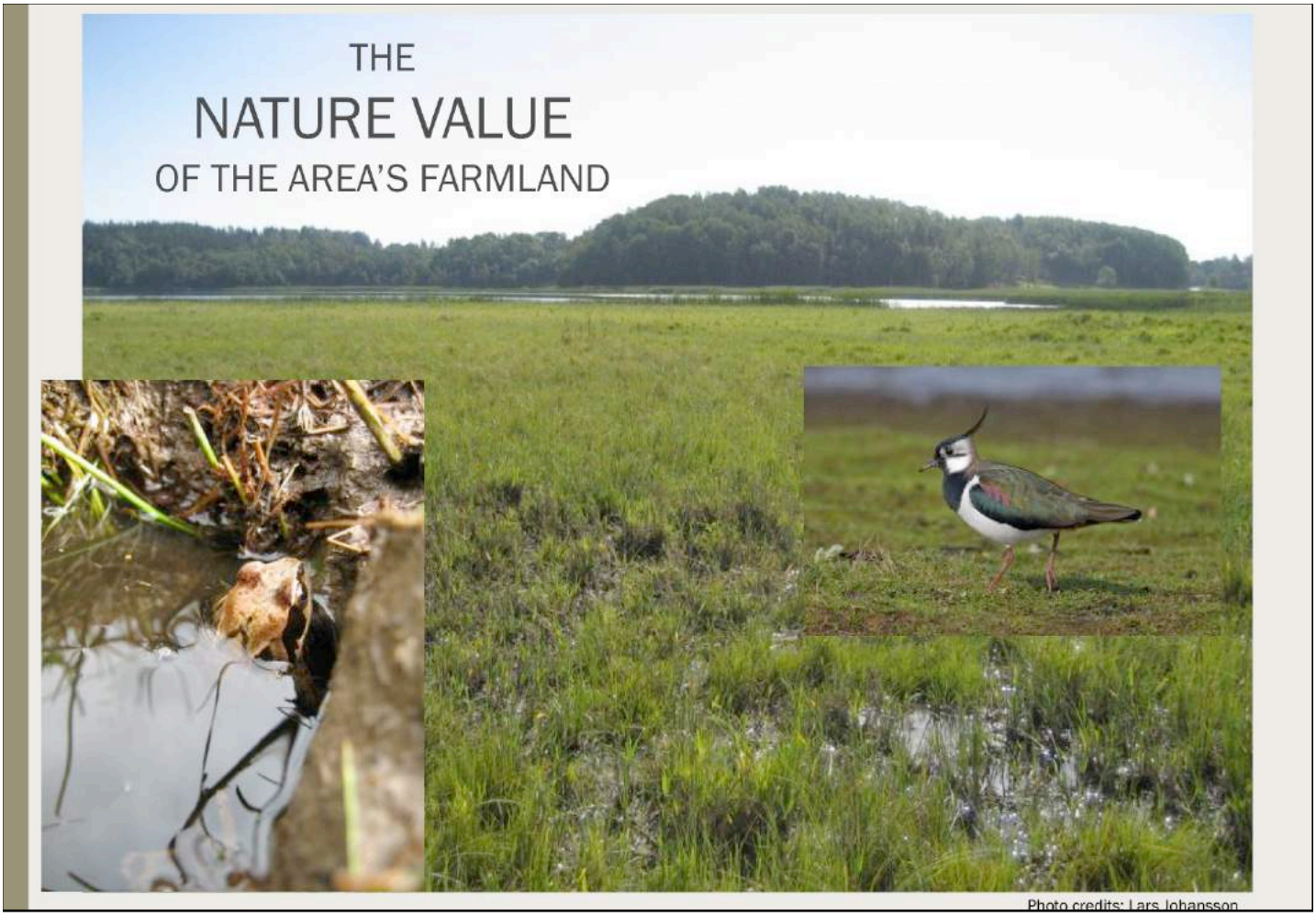
Relevant Natura 2000-categories: Fennoscandian lowland species-rich dry to mesic grasslands

Spread out in the landscape you will find different types of grasslands with trees. These were often historically used as meadows and often today have large veteran trees, many of them oak.

Environments, as shown on the photos, are the last remains of widespread landscapes of meadows and pastures. Recently grazing was re-introduced in this specific area after a 60 years break in such traditional land use.

Habitats with a long continuity with old trees and grasslands or meadows are often characterised by its rich flora of lichens. *Lobaria pulmonaria* is a good indicator for valuable habitats, with high environmental qualities.

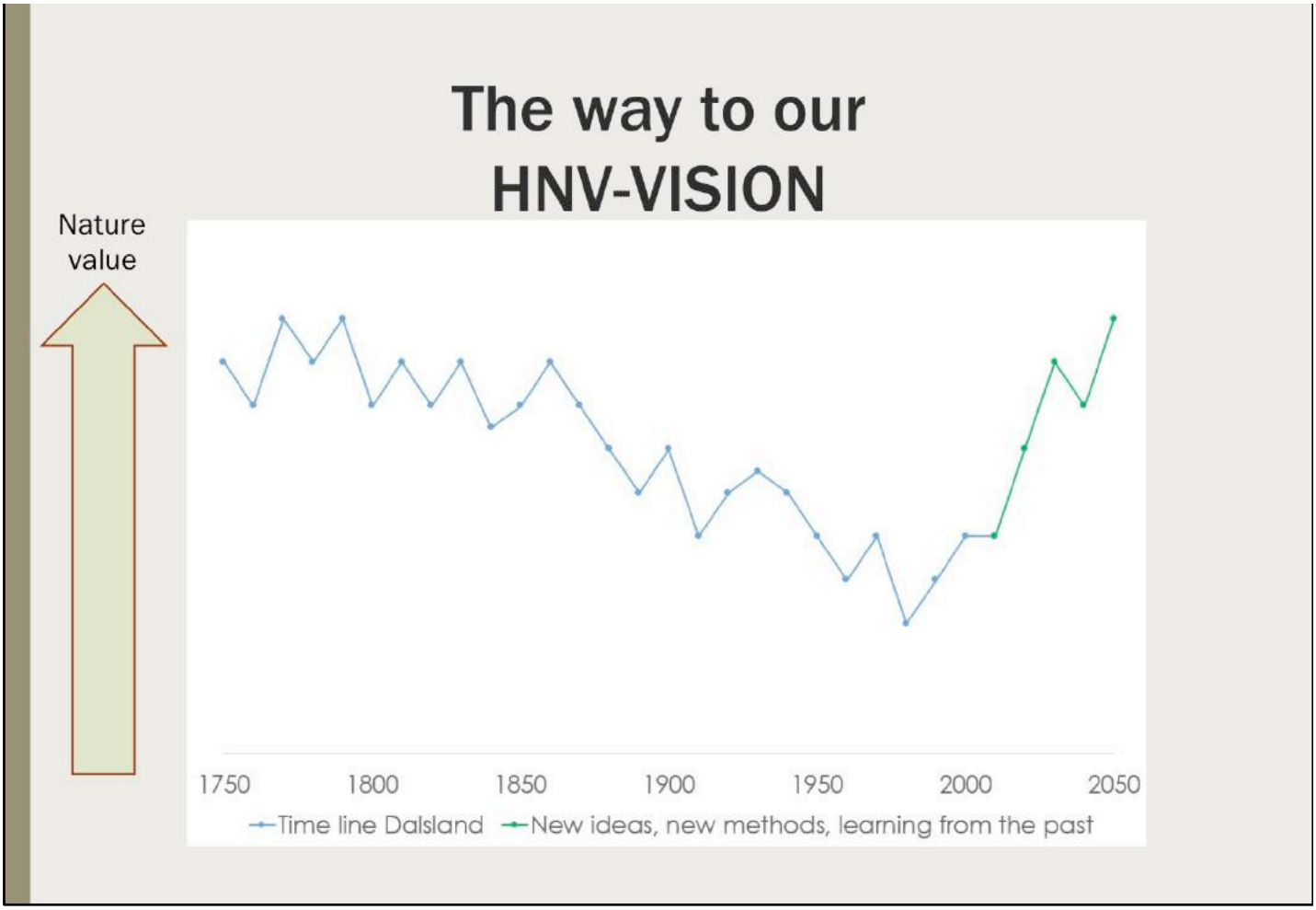
Relevant Natura 2000-category: 9070 Fennoscandian wooded pastures



Most of the area's major lowland lakes are found in the eastern and southern parts of the landscape. In those areas where grazing is maintained, it creates environments where aquatic insects, frogs and reptiles and wild birds are able to flourish.

The photo shows a part of the pastures around Hillingsätersjön, in the Valley area. For fifteen years, you couldn't see the lake from where the photo is taken - tall common reed *Phragmites australis* and a shrub cover got established after grazing disappeared in the 1960's. But when grazing returned, many species, especially birds, also came back. Species such as lapwing *Vanellus vanellus*, starling *Sturnus vulgaris* and snipe *Gallinago gallinago* now breed once more on the floodplain.

Relevant Natura 2000-categories: 6410 Molinia meadows on calcareous, peaty or clayey-silt-laden soils



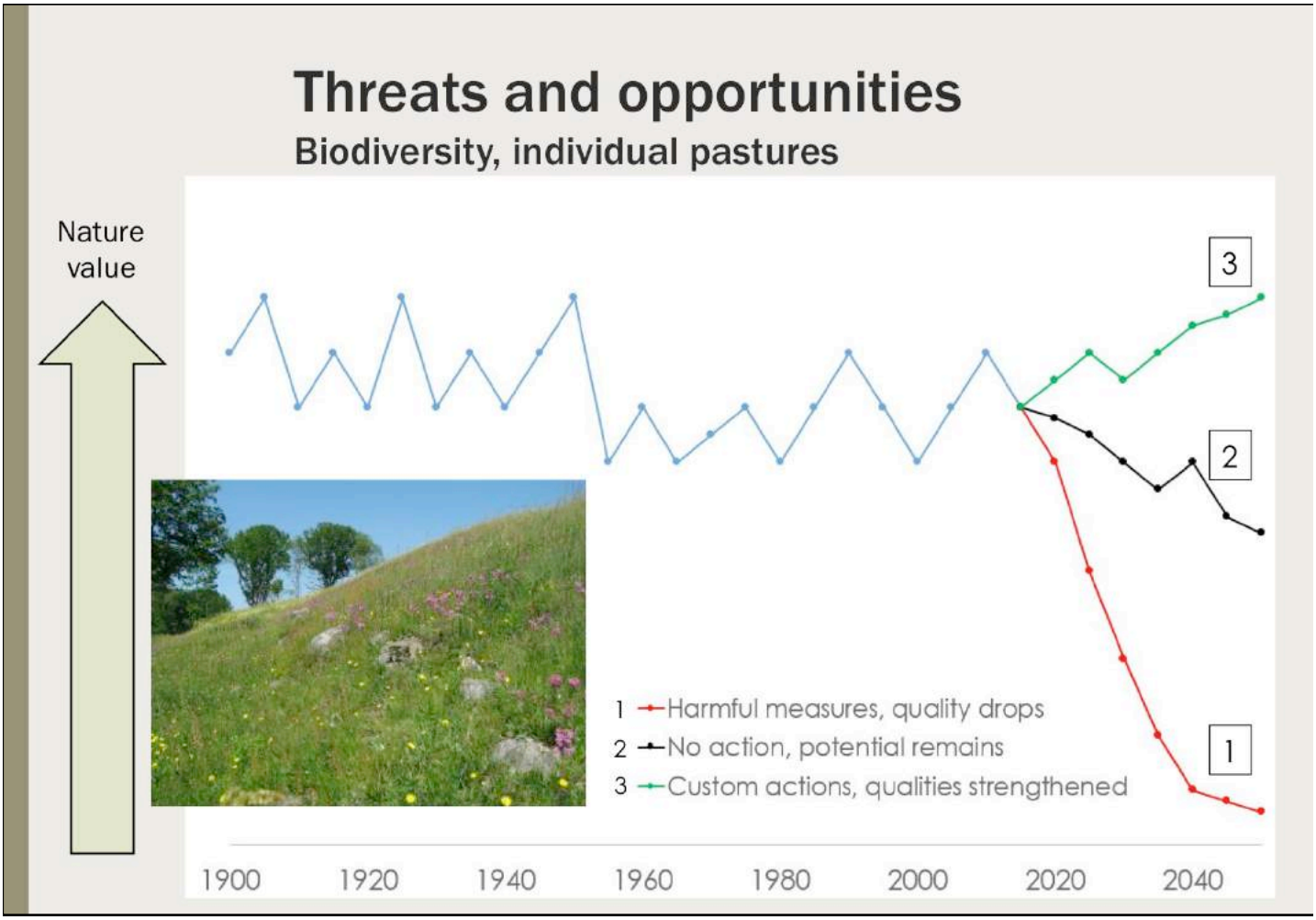
How can we reach our vision? How to avoid ending up in a Business As Usual scenario? Both these questions are interwoven, but we have chosen to look back in time in order to better understand today's situation and future potentials.

Meadows, as a type of agricultural land, has almost ceased to exist today. In addition, outfield grazing has also ended in practice. Natural pasture remains, but only to a modest extent. Land uses that, to a large extent, replaced the natural fodder fields, such as modern forestry or grain or field crops, do not produce high nature values (HNV).

What does this mean for biodiversity at the landscape level? The figure tries to illustrate an historically downward trend. BUT, the figure also tries to illustrate that it is possible to reverse the trend. The green part of the curve illustrates a radical shift which is necessary if we are to reach the HNV vision.

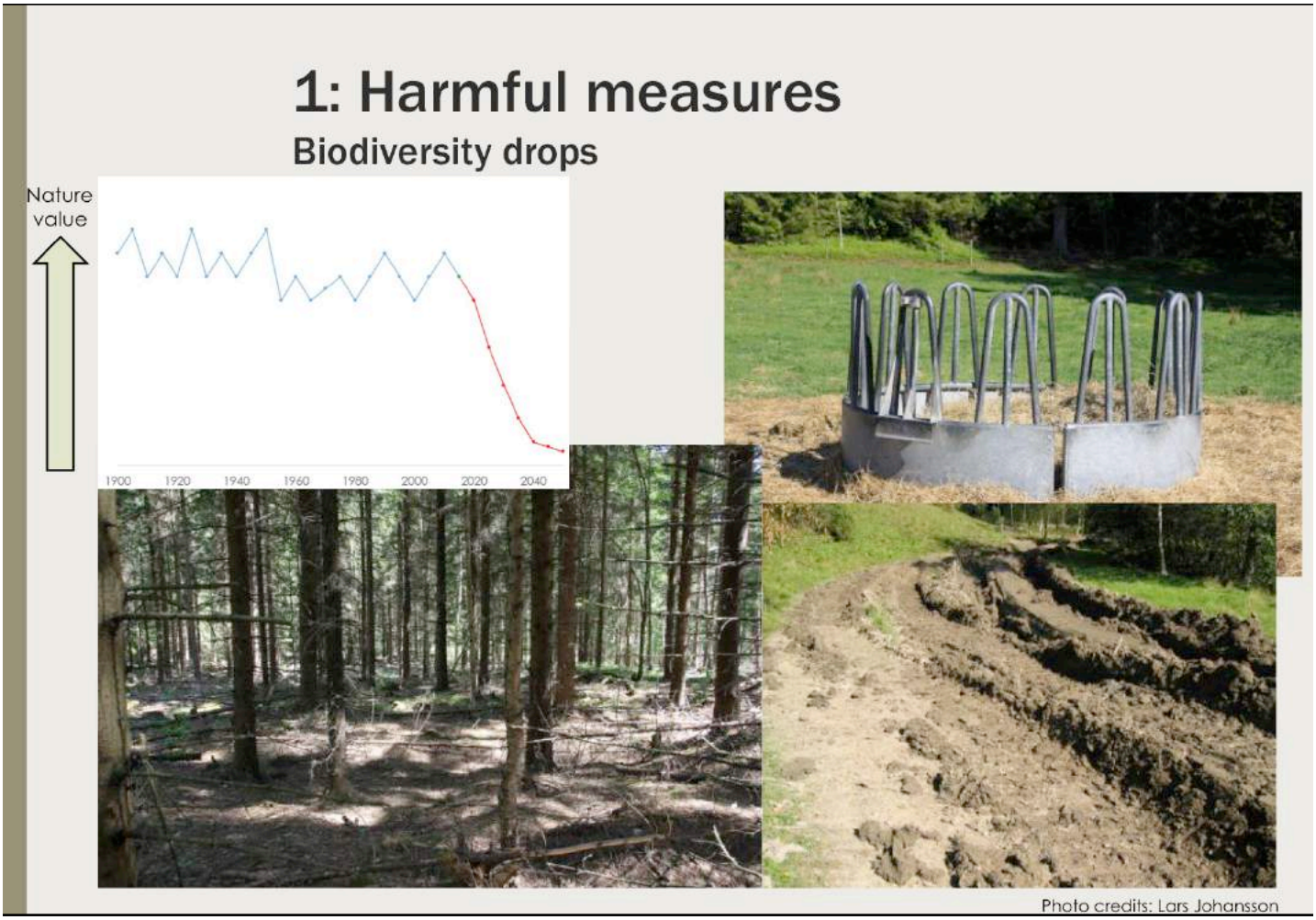
How do we achieve this? One way to think about it is to see the landscape as a puzzle. The entire puzzle can be difficult to solve immediately. But if we take a bit at a time and work systematically, making progress by each piece of action, we will probably be able to solve the entire puzzle in the long run.

We start by studying one of the pieces of the landscape puzzle; a single, semi-natural pasture.

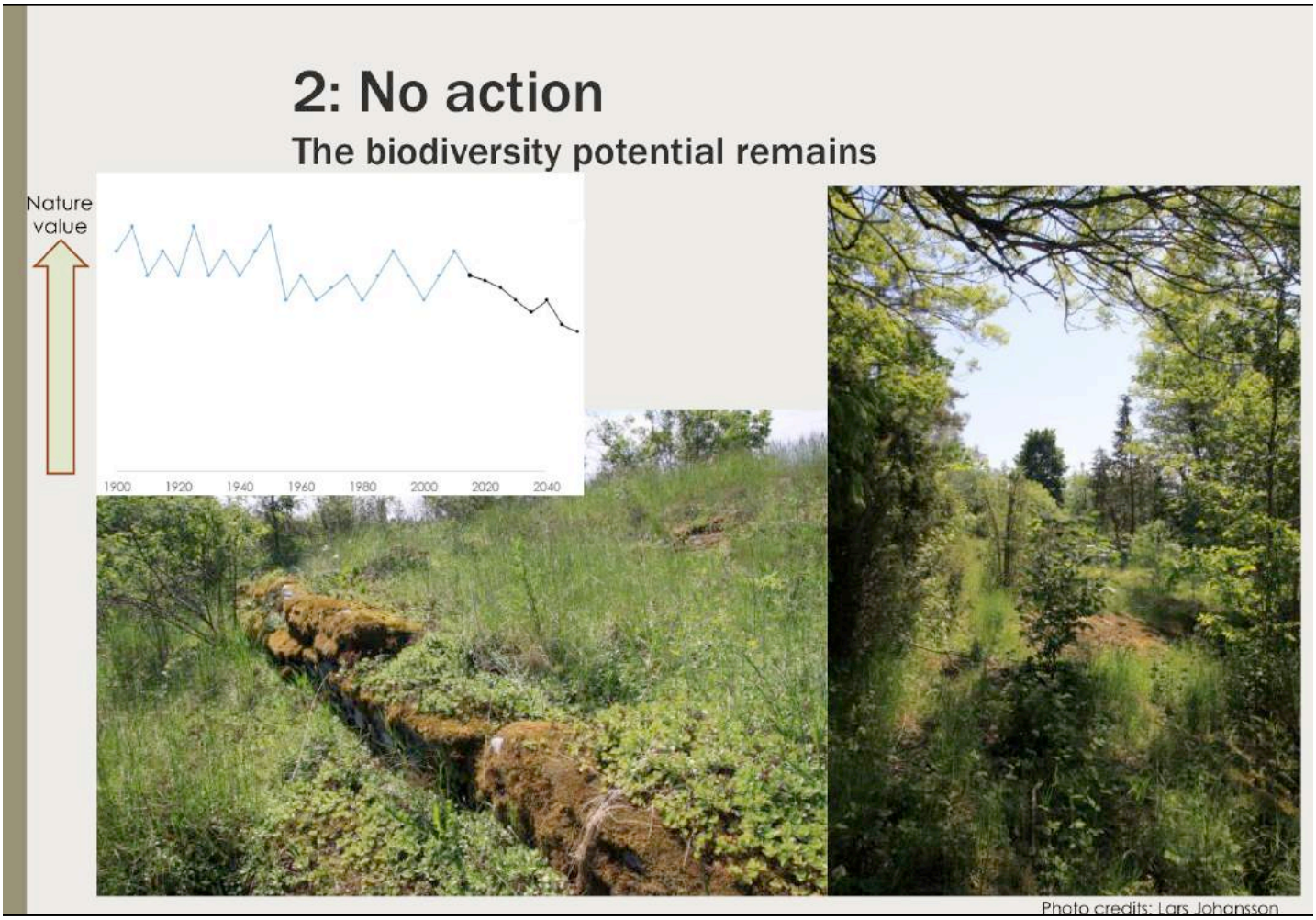


Pastures in the example given have been grazed until today, reflecting a historical continuity in the land use and management. It has a species-rich flora and we guess it had similar qualities earlier. But how will this piece of puzzle contribute to the biodiversity puzzle in the long run? Positive or negative?

Which of the scenarios one, two or three will be realized? Of course, it depends on what measures are being implemented from now onwards. The next pages give examples of what this may mean.



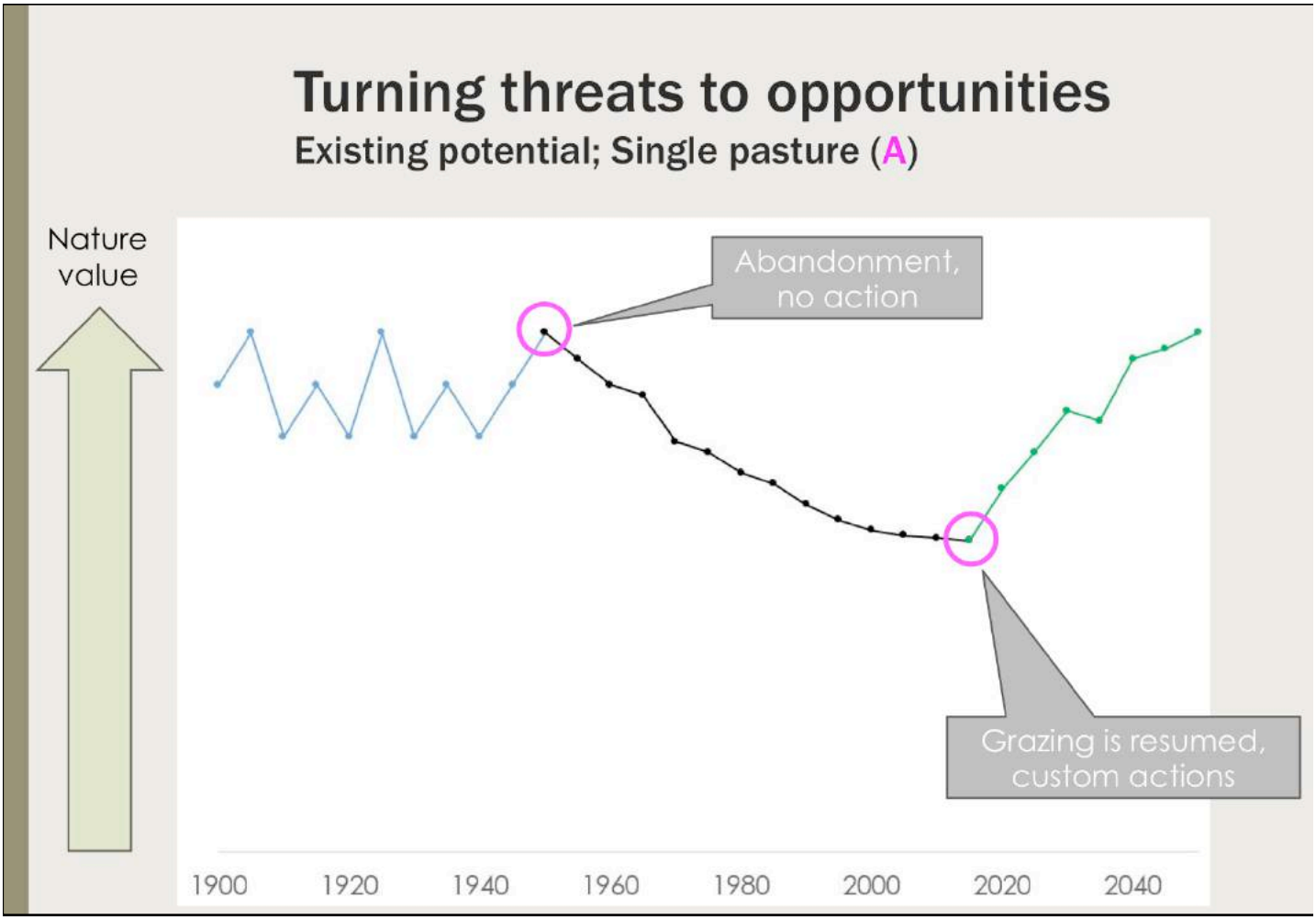
The pictures show three examples of measures that will rapidly reduce biodiversity. In fields which still are being grazed, supplementary feeding is the single most important explanation for declining biological qualities. In fields that are no longer grazed, it is the planting of spruce that is the most common cause of decline. Environmental damages due to heavy machines and bad management are also common in both grazed and un-grazed fields.



The pictures show calcareous flatrocks that have not been grazed by livestock for a longer period of time, probably about thirty years. Here the potential for getting back high biodiversity will remain good for many years to come. However, were actively harmful measures to be carried out, such as planting of spruce or supplementary feeding of any reintroduced grazing animals, the quality would fall rapidly. Doing nothing is in this situation better than doing the wrong things.

Historical land use is very important for the quality of a piece of land today. If we are able to read the signs in the landscape, such as indicator plants, or have access to historical maps, we can draw conclusions about traditional management, and thereby more easily adapt today's management.

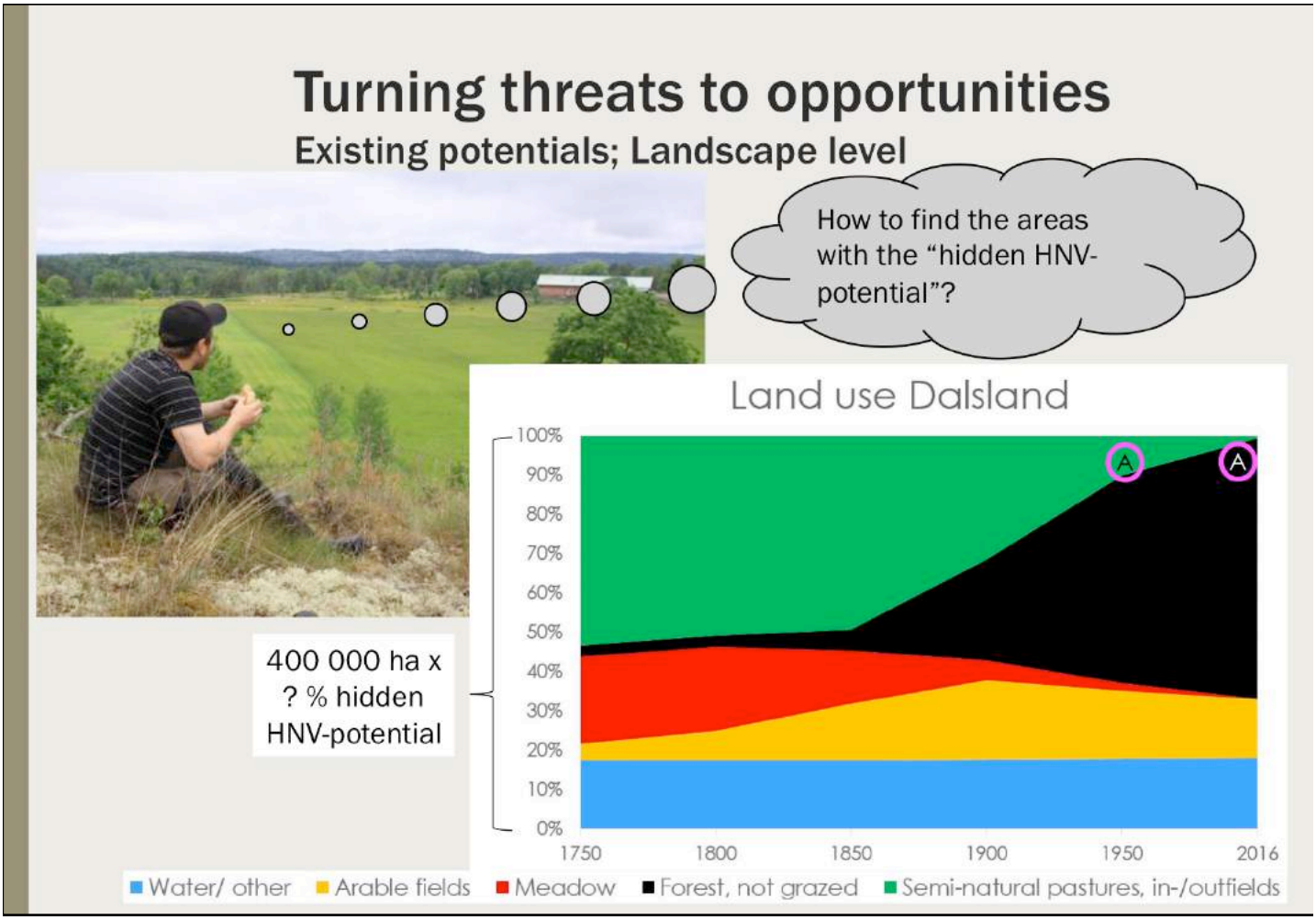
The pasture in the picture were found to contain a number of plants that indicate a mowing history; historical maps confirmed this. Based on that historical management, grazing was adapted in a variety of ways. For example, cattle got access to the land later in the season, at the same time as it was considered that mowing occurred. The effect was a greatly increased bloom, and after a few years also an increased number of individuals benefiting from mowing activities.



If the natural pastures and mown meadows which are still actively managed are abandoned (or managed in a harmful way), this would be a major threat to achieving the HNV vision. But even if we succeed in maintaining the areas which are still actively managed and their qualities, this will not be enough for reaching the goals set out in the HNV-vision.

Many of the finest and most valuable areas in Dalsland disappeared a long time ago. Many of these are gone forever, for example, when urban areas grew or when meadows and pastures where transformed into production forest or arable field. But some have just been abandoned, and slowly overgrown.

It is within the latter type of areas, those which were spontaneously overgrown, where we see great potential for the future. The figure attempts to illustrate how such a development might look, where grazing is resumed after a long period of having been set-a-side.



We know from previous experiences that there are still good opportunities to find abandoned areas with HNV-potential . But areas with this "hidden" potential, are often seen as forest in the statistics and also in the mind of landowners and other stakeholders, see lower right graph.

Some of the most important measures to reach our HNV-vision are therefore to identify the areas with HNV-potential before they are lost forever. We also need to identify the actors who are in control of land use in these areas, and to develop efficient and constructive collaborative structures.

At the meetings we had this spring, many actors in society, like landowners, tourism entrepreneurs, municipal officials, politicians and representatives of different associations, expressed similar views: They see a potential in a process of re-creating the values and biodiversity once lost in Dalsland.

We know that it is possible to carry out restoration measures in a cost-effective and rational way when landowners, animal keepers, government agencies and contractors learn and act together. And we know that with careful preparation, and with the right support, the actors can find solutions together that make it economically interesting to manage the land with a long-term perspective.

Of course, there is one main challenge to be handled before beginning to implement the vision: how to finance the initial, often very costly, restoration phase. This is a core issue in our Learning Area. Can we find any kind of business model, form of cooperation, product or project funding to manage this threshold?

We are excited to study other countries' innovation lists for inspiration!

The left photo shows an example of a kind of abandoned, overgrown pasture, which is quite common in Dalsland. This is how it often look like before restoration starts.....

...and the right photo illustrate how it might look like some years after, when measures have been made to improve the situation.

We developed the Baseline Assessment for LA Dalsland:

Anders Andersson, Anders Forsdahl, Anders Nilsson, Andreas Gustavsson, Anna Johansson, Annika Karlsson, Bengt Skalstad, Bo Sandeberg, Börje Pettersson, Christer Jansson, Christian Nilsson, Fredrik Fredriksson, Jan Linsten, Jan Sandell, Jeanette Lindh-Svanqvist, Jesper Johansson, Anita Johansson, Jim Matsson, Johan Abenius, Johan Larsson, Kaisa Carlgren, Katarina Johnsson, Katrin McCann, Kerstin Söderlund, Kristian Håkansson, Krystyna Gustavsson, Lars Bergström, Lars Johansson, Lars- Olof Ottosson, Lars-Rune Larsson, Lisa Karnfelt, Magnus Karlsson, Magnus Ljung, Magnus Nilsson, Magnus Karlsson, Marie Hansson, Marie Odenbring-Widmark, Martin Carling, Martin Pettersson, Miriam Sannum, Per Undeland, Petter Bohman, Renée Olsåker, Richard Andersson, Sara Roland, Sara Vogel-Rödin, Sophia Olander, Stefan Arvidsson, Svante Hultengren, Torbjörn Johnson, Tove Ortman

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A thematic network on High Value Farming
Learning, INnovation & Knowledge

LEARNING AREA « DARTMOOR » (United Kingdom)

A BASELINE ASSESSMENT

Authors: John Waldon & Gwyn Jones
Date: June 2017

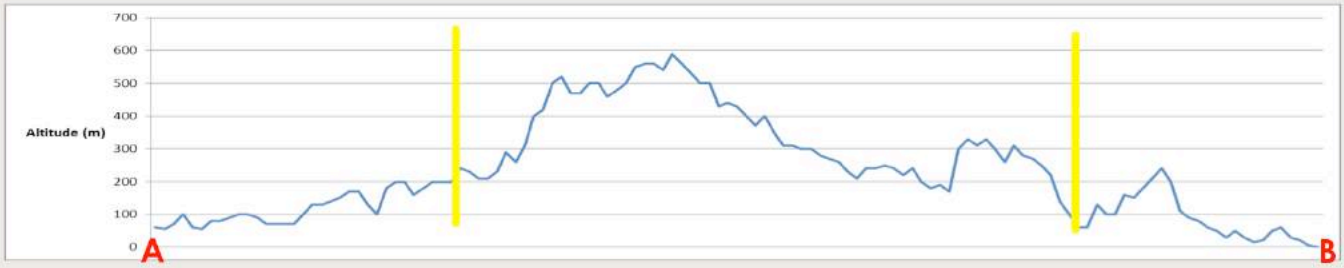
This project has received funding from the European Union Horizon 2020 research and innovations program under Grant Agreement No. 696391

The area

A portrait

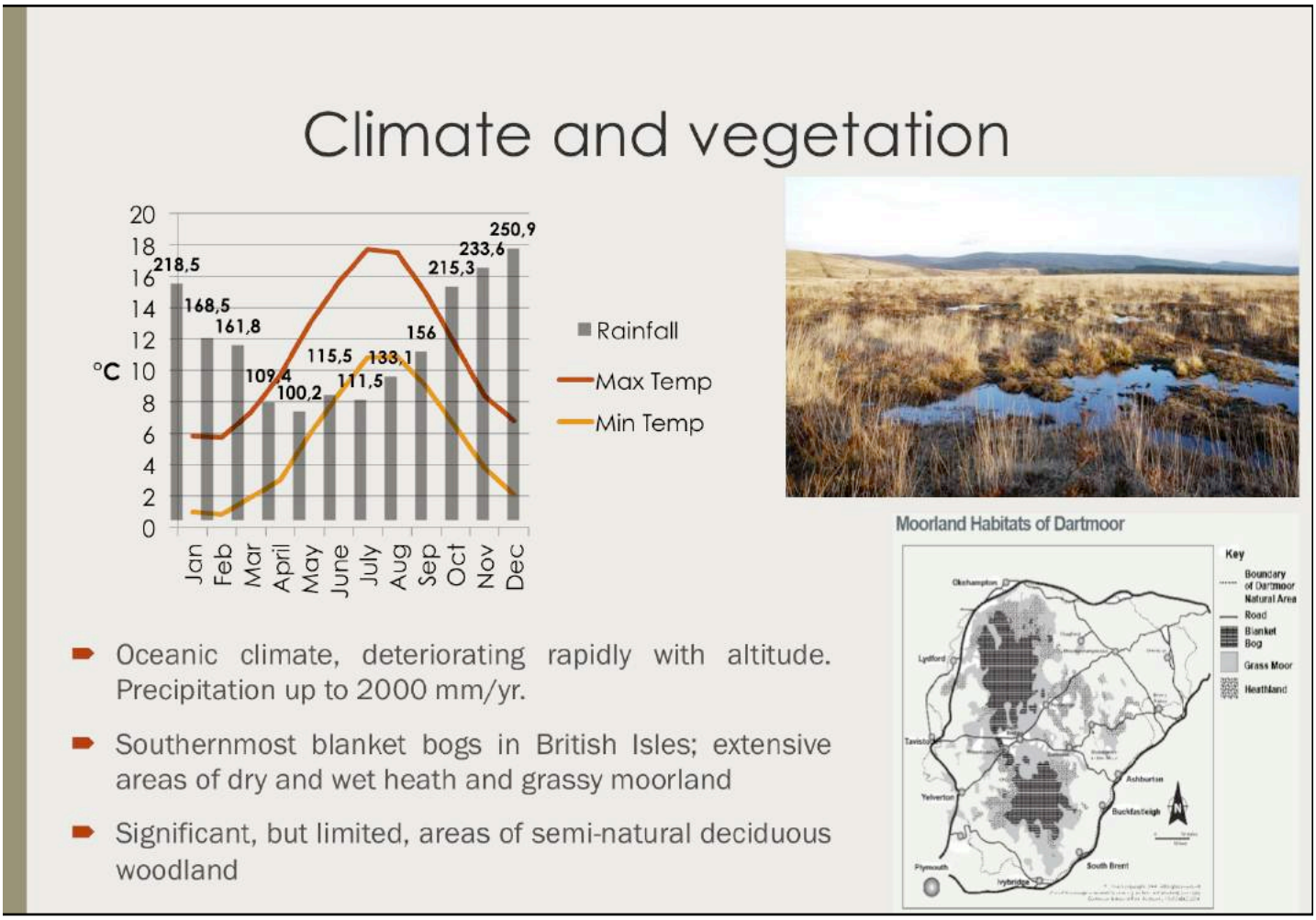
Boundaries and key characteristics

- The Learning Area consists of the 35,000 ha of common land in Dartmoor National Park (DNP) and the farms which use that common land
- Dartmoor's 46,000 ha of moorland is by far the largest area of unenclosed land in SW England
- Farmland, including common land, makes up 85% of the area, with woodland/forestry 11%, reservoirs 1% and urban areas 3%



The Learning Area consists of the 30,000+ ha of registered common land within the granite upland block of Dartmoor National Park (DNP) in SW England and the farms which actively use their pasture rights on those commons – currently around 500 farms.

These farms are located overwhelmingly within the DNP, but don't include all farms within the Park. The area of the farms using the moorland is not known. Some hill farms also have their own sole use moorland – around 1/3 of the total moorland in DNP. This is also HNV and shares some, but not all, of the issues facing common land within the Park.

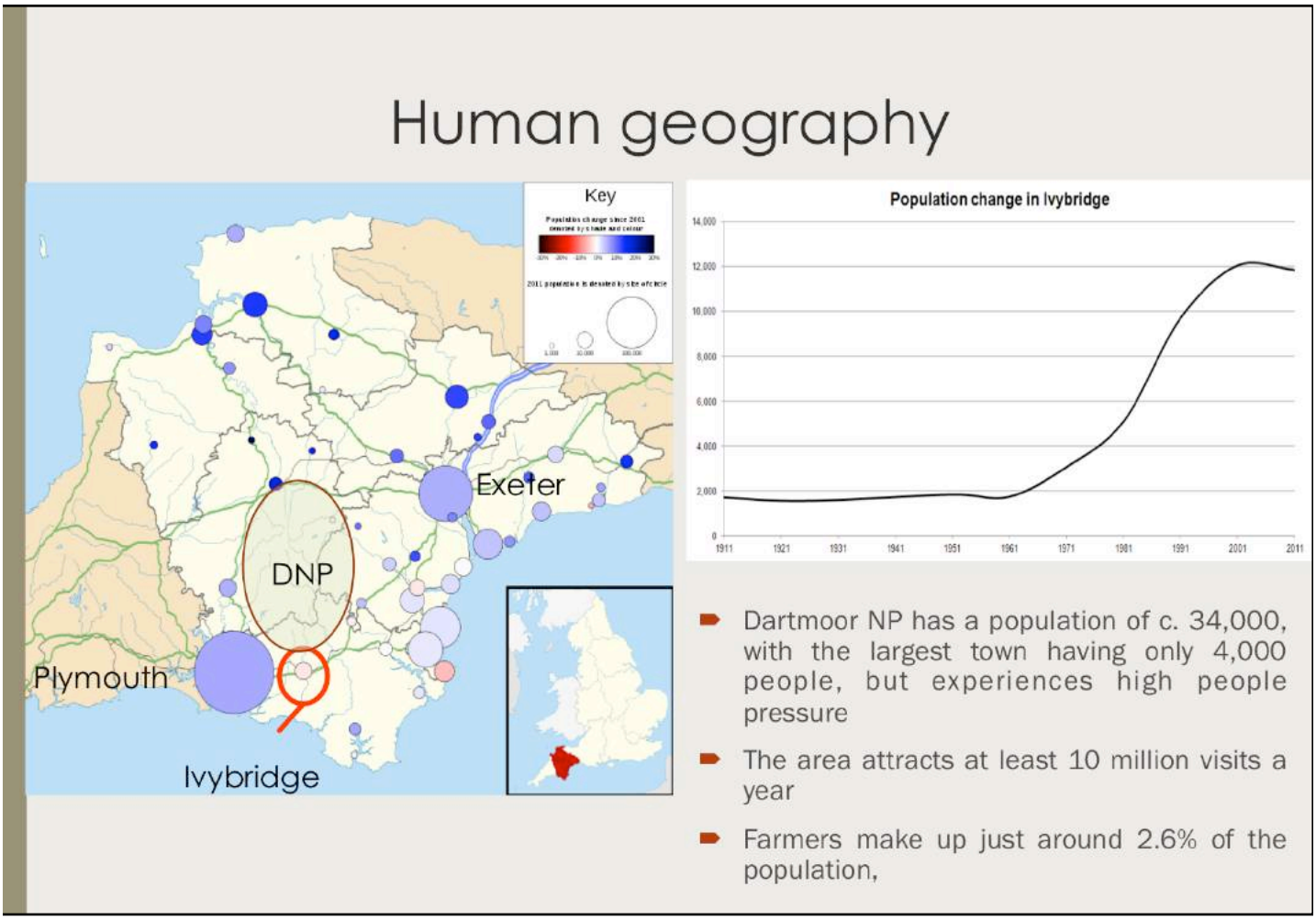


Dartmoor is the largest granite massif and most southerly upland area in the UK. Situated in the middle of the county of Devon in SW England, its highest point is High Willhays at 621m and 51% of DNP is above 300m. It lies south of the maximum extent of the Pleistocene glaciations – the largest upland in the UK to have been ice-free – and so the valleys surrounding the central core are narrow and deeply-incised.

Dartmoor's climate is Oceanic - cool and wet and lacking in extremes. Rainfall averages reach a maximum of around 2150mm. Climatic conditions worsen rapidly with altitude, allowing the formation of stagnic podzols, stagnosols and, covering large areas of the moorland, blanket bog histosols. Similar poorly drained conditions occur in many valley bottoms. These climatic and pedological conditions are severely limiting factors for the growing season and for agriculture, with the best land being in general found on the lower slopes and at lower altitudes. In this climate, grass has always had advantages over arable crops for supporting livestock.

The semi-natural pastures fundamental to the High Nature Value of Dartmoor can be found in three types of farmland context:
- The unenclosed moor, much of which is still common land
- 'Newtakes' (land enclosed from the moor) of various ages and are not common land
- Long-established inbye (enclosed) land predominantly permanent grassland with little floristic interest

The unenclosed moor is almost wholly semi-natural, with a spectrum of habitats ranging from bracken to dry grass moor to wet grass moor to blanket bog to wet heat to dry heath, depending on the combination of grazing history and soil conditions. As well as having some of the most southerly blanket bogs in the northern hemisphere, Dartmoor's *Calluna vulgaris – Ulex gallii* dry heath communities are rare outwith Britain and Ireland.



Dartmoor experiences considerable non-agricultural human pressure. It has two significant urban areas, Plymouth (262,700) and Exeter (127,300), on its doorstep. Plymouth, extends almost as far as the nearest common land.

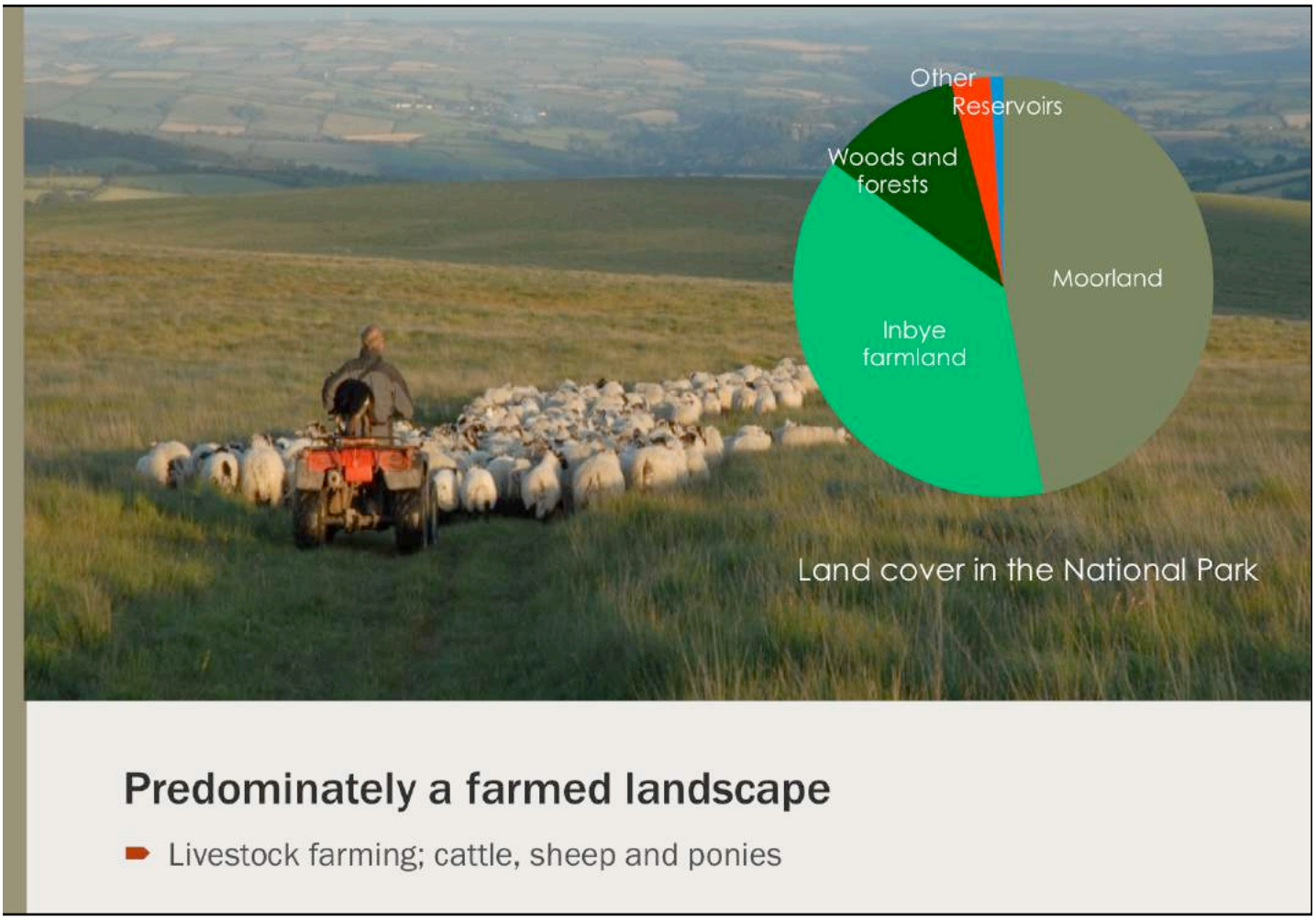
2 major road corridors run to the N and S of the moorland core – villages in those corridors especially have grown in population (see the example graph of Ivybridge above), with workers in Plymouth and Exeter often commuting from homes in the more desirable country villages.

It experiences a large volume of both local and national tourism in its own right and is also on the tourist route to Cornwall to the west. It is an area considered desirable for house buying, including for second homes, holiday letting and retirement.

Farmers are very much a minority, making up just 2.6% of the Park population in communities which nowadays have large non-rural elements.


Western moorland fringe
– abrupt transition within one farm's width;
larger holdings, many with fields outwith the Park boundary
DNP boundary
Image © 2016 Getmapping plc
Tour Guide
2002
Imagery Date: 8/8/2015 50°35'10.68" N 4°06'45.82" W

On this side of the Park, there is a considerable area of land away from the moor included within the designated area.

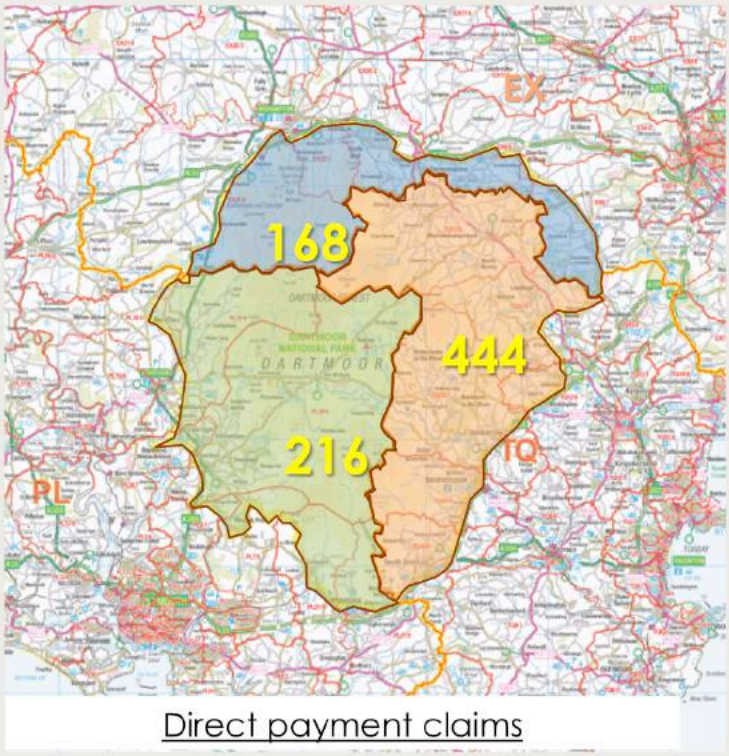


Key: Moorland – un-enclosed grass and heath dominated rough pasture

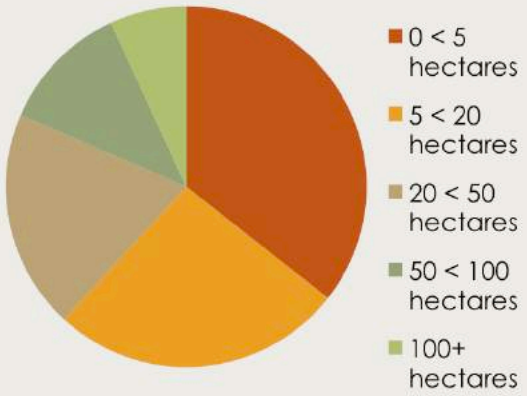
In-bye land = farmland, enclosed by stone walls and occasionally fences. Predominately improved reseeded grassland.

Woods and Forests = predominately deciduous woodland, some ancient and conifer plantations.

Agriculture: holdings



Direct payment claims



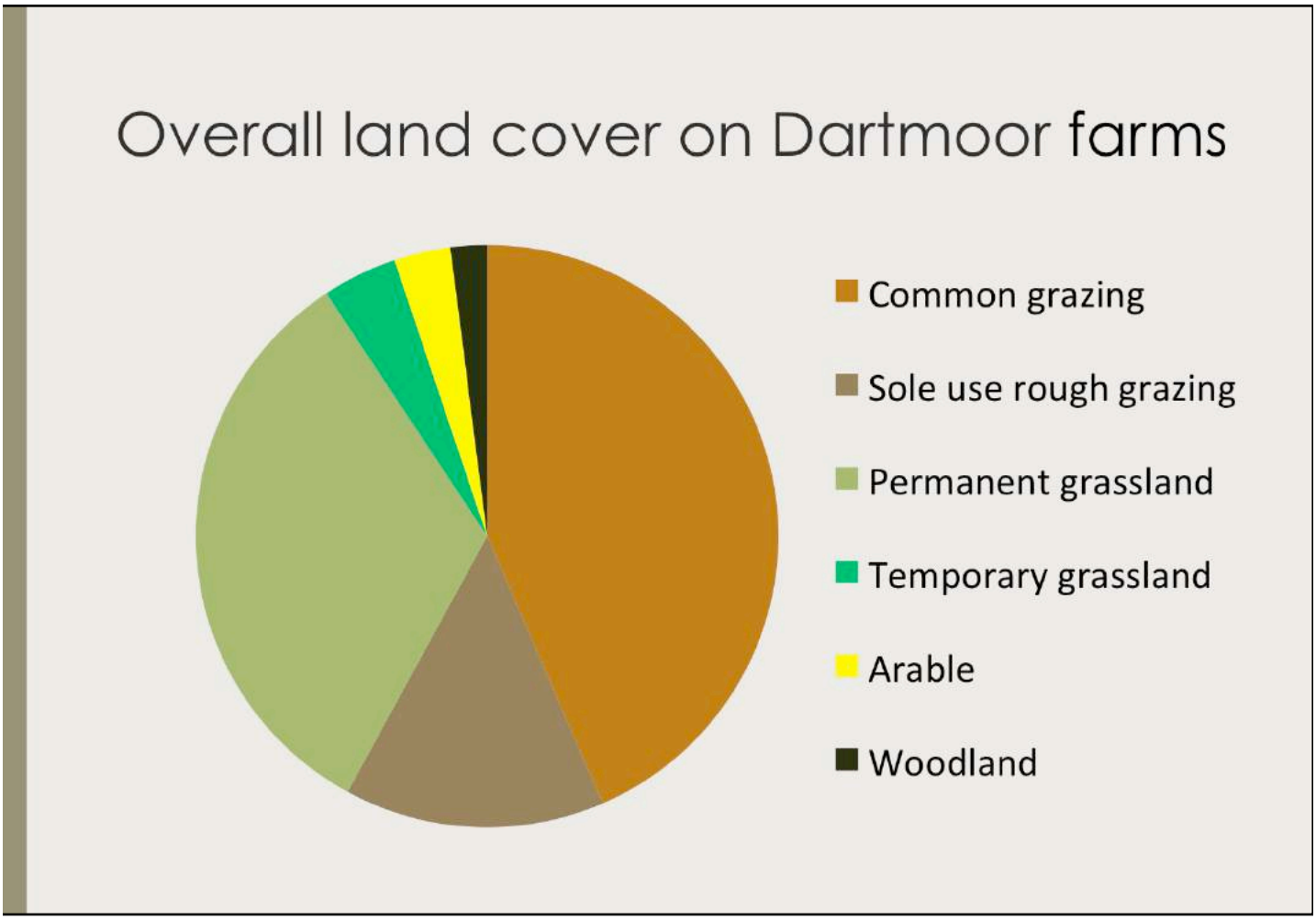
Size distribution of holdings

- Almost 1300 holdings, of which around 900 'major holdings'
- 800+ direct payments claimants

As in many parts of the UK, there is a surprisingly high number of smaller holdings, with half the 800+ direct payments claimants receiving less than around €4000 in 2015.

Hill farms are more likely to be large, and larger holdings more frequent on the western side of the moor, where the transition between upland and lowland is more abrupt (see following two slides). The eastern side, in contrast, is more hilly, with a series of deep valleys where smaller holdings can persist. The east side also has many more settlements, and small holdings are considered attractive properties to purchase by the less agriculturally-inclined.

Expert opinion is that the farms which use their common rights are disproportionately large.



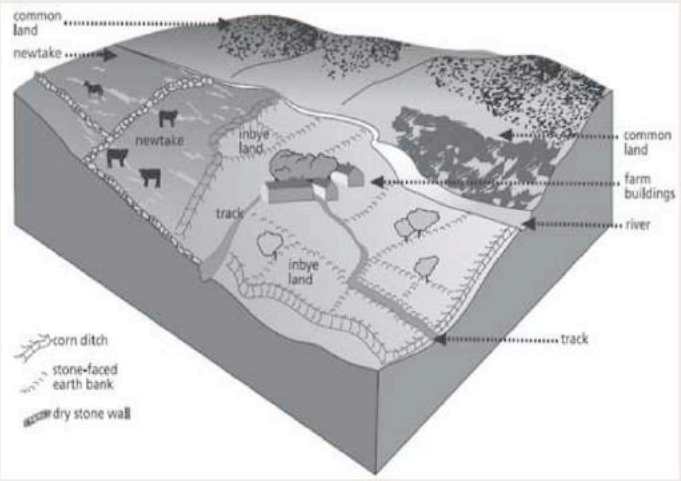
Taking Dartmoor farmland as a whole, the predominance of permanent pastures is striking, as is the fact that over half the farmed area remains semi-natural grassland. No rigorous data is available just for those farms which actually use the commons, but the predominance of this resource in their farmed assets will be even higher (we estimate that permanent pasture:sole use rough grazings:common grazing ratios of the order of 1:1:2 are representative).

The moorland is used for grazing livestock – cattle, sheep and ponies. How it is integrated (or not) into the wider farm system varies significantly from holding to holding. Examples include:

- Providing a free summer grazing resource, freeing up the inbye land for the growing of winter fodder
- Providing a cheap grazing resource for the use of less demanding animals, e.g. Dry cows, young stock
- A source of progeny, some of which is sold fat, some of which is sold store for fattening elsewhere (on-farm or by other farms), and some of which is used as breeding stock for the inbye system (perhaps as cross-breeds). This is especially the case for sheep systems.

Many of the larger farms now own or rent ground on the lowland outwith DNP.

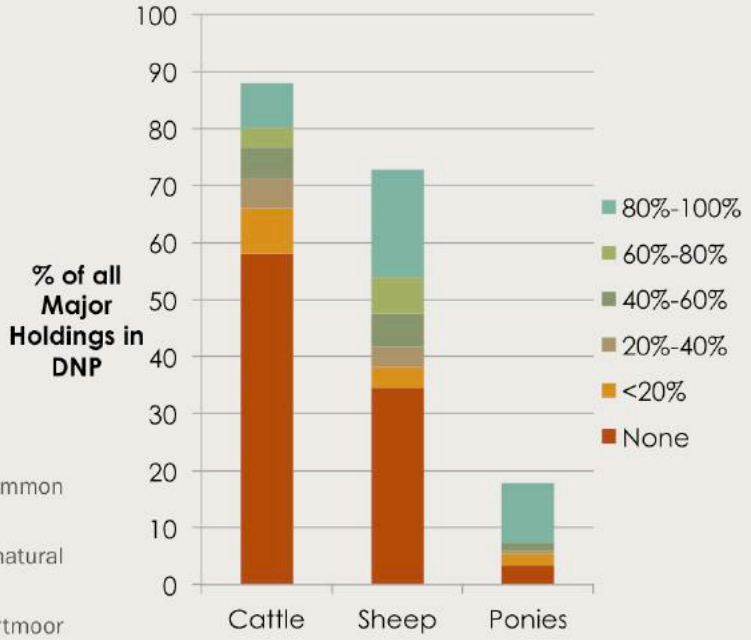
The hill farm in the landscape



- Unenclosed moorland and many 'newtakes' (enclosed sole use rough grazings) are semi-natural and extensively managed
- Inbye land overwhelmingly improved grassland, with small % of arable. Remaining semi-natural of high nature value, but trivial on landscape scale
- Farm often has large number of sheds for inwintering (and sometimes finishing) stock

Agriculture: common land

- Around 500 holdings have pasturing rights on common land
- C. 35,000 ha of common land – dominates semi-natural vegetation of Dartmoor
- 37 commons associations, overseen by Dartmoor Commoners' Council
- It is thought that around 200 holdings actually depasture livestock on the commons

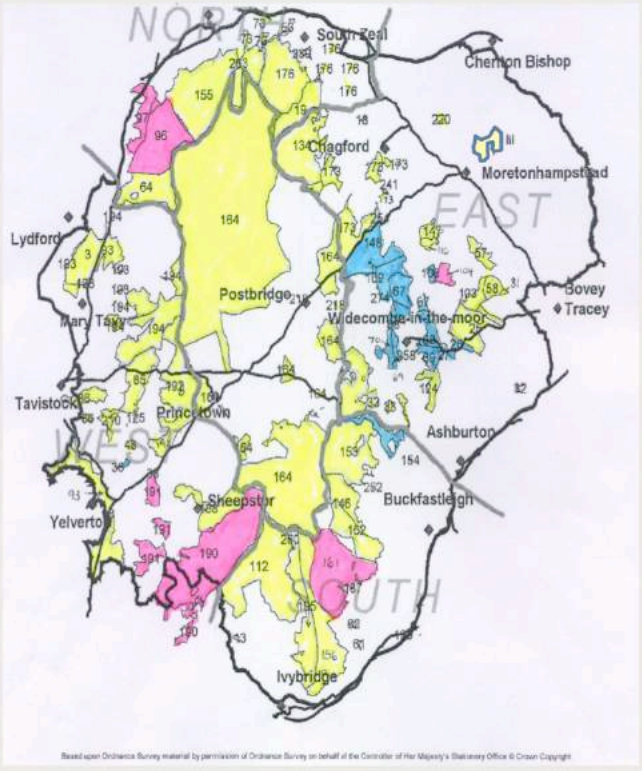


% of livestock using the commons per holding and type of livestock c.2005

Common land is a very important feature of the Dartmoor landscape, but is only used today by a proportion of farms, even within the National Park. Within that cohort of holdings, the proportion of the different livestock sent to the moor also varies considerably, with ponies and, to a lesser extent sheep being more likely to go to the moor than cattle.

In historic terms (see following slides) the present day is probably most unusual in terms of the proportion of farms using the commons resource – in former times, even holdings at some distance from the moor would send summering cattle there.

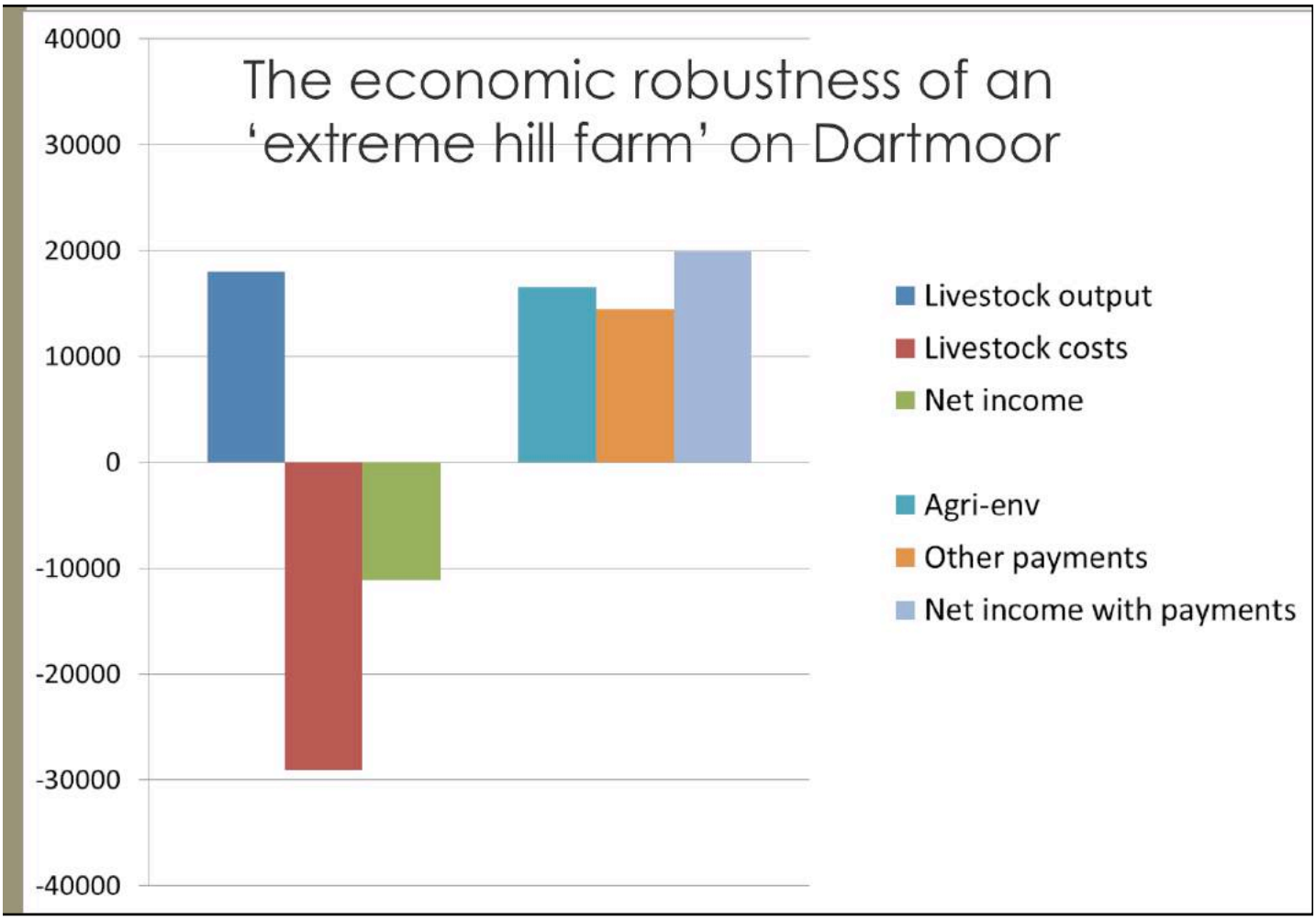
Commons self-governance and agri-environment



This map shows the distribution of the commons. Each common is registered as a separate common although many are contiguous with other areas of common land without a physical boundary. The majority of commons have an association elected by those farmers and non-farmers with grazing rights on that common and an association is required to access an agri-environment agreement for the common. Where a common fails to create an association it is unable to enter that common into an agri-environment (AE) agreement.

Stock numbers are regulated by the AE agreements to ensure the grazing pressure is compatible with the ecological requirements.

Where a common is not in an agreement the stocking regime is controlled by overgrazing regulations that are linked to the support payments (Basic Payment Scheme payments) and breaches of the regulations can incur a financial penalty.



Current systems of hill farming on Dartmoor are loss-making in the absence of support payments. If all unpaid family labour and family capital invested in the business (including land and buildings) is included in the calculation then the average hill farm has an income deficit of the order of €20,000.

Furthermore, the size of the net profit is small compared to that of both the output and expenditure, making the economics very vulnerable to small changes in either or both.

Support payments can account for 60% of total output, and 150% of net income, if family labour is properly costed and a return to investment is assumed.

	Common	Newtakes	Inbye
Area ha	150	75	75
Stocking (LU)	60	135	
Est. BPS	8925	4462	15555
Est. Agri-env.	9000	3000	
Livestock & misc. output		60900	
Livestock & misc. costs		-80850	
Livestock net profit		-19950	
Livestock net profit allocated by LU	-6138	-13811	
Overall net income split	11786	9205	

Agriculture: an attempt at allocating output and costs

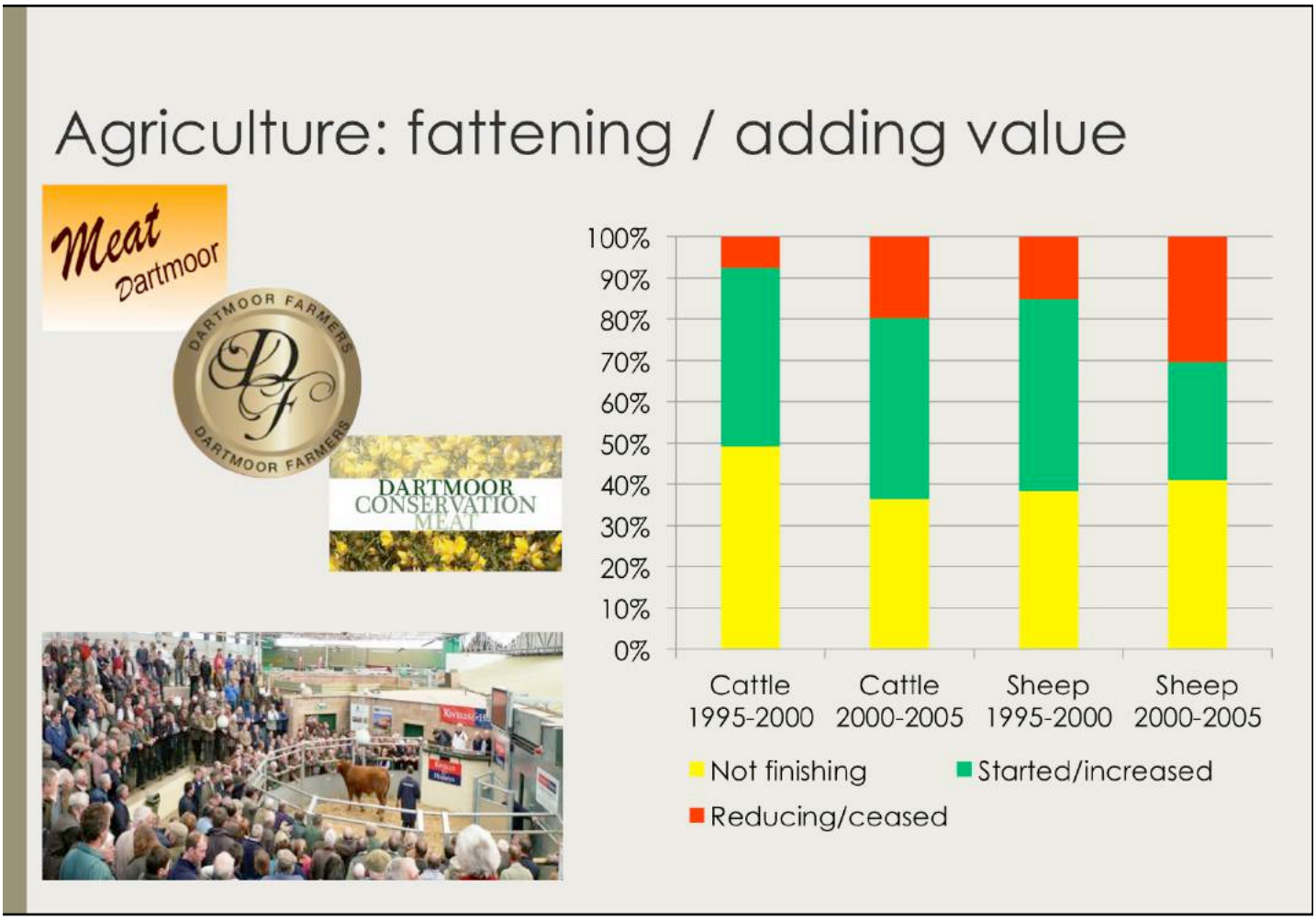
Within the overall farm economy, a crucial question is the competition between different systems for the farm's resources – capital (farm infrastructure, ongoing expenditure) and labour (not least the unpaid family labour). Factors which are important considerations might include not only the rate of return, but the total amount of profit generated and even things like the feeling that resources should be put to full use.

The decoupling of support payments makes understanding the relative economics of the potentially competing systems very important – unlike in the past, it is at least possible for the part of the farm economy bringing in most of the payments to be the area with fewest livestock, for example. However, estimating the partial budgets for sub-subsystems or sub-areas within the farm is far from easy. In this slide we present a first attempt which we know is unlikely to give the full picture, but nevertheless raises some of the difficult questions farmers have to answer in their own business decisions.

We imagine a model Dartmoor farm (areas and stocking based on various reports from the last 15 years). BPS data can be estimated with some degree of confidence; the figure for agri-environment payments on the common is broadly representative; the agri-environment figure for the inbye is more of an educated guess (and is decreasing annually as the withdrawal of the entry-level scheme works itself through). Output and cost data for the actual livestock system are taken from an 'extreme Dartmoor hill farm' example from the literature.
The big question is how to allocate the output and cost figures to the different parts of the farm. The inbye land is likely to account for a disproportionately large amount of both variable and fixed costs, but probably for a larger fraction of the output. As a first estimate we have assumed that both costs and output vary with the livestock numbers, i.e. The net profit from livestock is allocated according to the total number of livestock on the common and enclosed land respectively.

The results are intriguing, suggesting that the half of the farmed resource which is the share of common land may actually generate more than half of the net profit, despite having only 30% of the farm's livestock. However, the total income generated from the moor is still modest – it might be argued that the farm needs the income from the enclosed land to generate the amount of money desired. We aim to discuss these findings further with the LA farmers and others.

It is important to note however that the value of the moor to at least some farms may not be expressed in sales from the moor, but rather as a source of breeding stock for more intensive elements of the system on the inbye land.



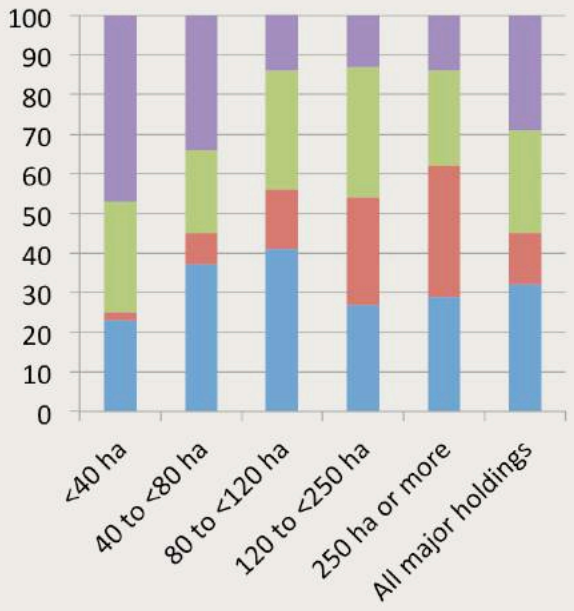
All holdings with animals are livestock breeders - the main variable is what proportion of the progeny are fattened on the holding. Most holdings are attempting to add value by fattening at least some of their calves and/or lambs and/or ponies, and the number doing so has increased in recent years. In 2000-5, 70-80% of holdings fatten at least some of their lambs and calves, but anecdotal evidence suggests that this proportion may have increased more recently, driven in part by the uncertainty caused by TB – the farm system has to be able to cope with standstills, so a default which makes the most of livestock kept at home minimises risk. Nevertheless, it would be surprising if farmers were not still sensitive to the price of store (unfattened) beasts, selling animals store if the prices are good.

Local marketing groups have developed to sell branded produce - shortening the supply chain and adding value by direct selling are both things which have been encouraged nationally by bodies such as EBLEX, and locally by the Duchy of Cornwall and DNPA. But note that despite the existence of the local meat marketing groups, most finished livestock is sold to intermediate buyers, whether through private contracts or through the local livestock markets.

There are 3 group marketing initiatives on Dartmoor:
- The earliest is Meat Dartmoor, which is little more than an umbrella organisation to link consumers to individual farms which carry out direct sales of meat. The 'guarantee' is farm-specific and the trading is carried out by the farm concerned.
- Dartmoor Farmers is a real denomination of origin, albeit not registered as a PDO. It is a limited company of around 30 shareholding farmers. It has a detailed specification, which includes rules about the source of feed, the breeds used, the ownership and birth holding of the animals etc. The organisation markets the meat collectively.
- Dartmoor Conservation Meat is an initiative to add value to ponies by selling horseflesh (an unusual product in the UK).

From talking to farmers, it sounds however as if none of these initiatives are having anything like a systemic impact. The largest and most organised of these initiatives, Dartmoor Farmers, has not made a profity in any year in which it has been trading. Farmers say that individuals can make a go of direct selling at least a proportion of their output to specific markets, as long as they use their own labour and have the right mindset for the job (though whether they properly cost their own time is the subject of speculation). But anything which attempts to scale up comes up against not only competition from the 'big boys', but the market's expectations of continuity of supply, uniformity of product etc.. 'People want something special and like the story, but they're not prepared to pay for it.'

Agriculture: non-farming income



Importance of non-farm income on a sample of major holdings c.2005

Principal farmer(s) and spouse(s) – nature of work	% of 100 FTE
Full time farming	58
Part-time farming	26
On farm, non-farming, FT	2
On farm, non-farming, PT	3
Off farm, FT	4
Off farm, PT	6

Reported employment situation in same sample

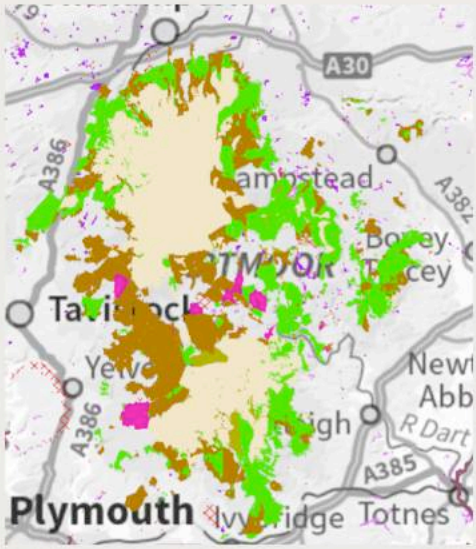
The dominant narrative is still that of the 'family farm'. But even in a sample of major holdings, non-farm income is earned on two thirds of all farms and is considered 'vital' on 1 in every 8 of the largest holdings. Overall, around 15% of the output (not the net income) on Dartmoor farms is earned from non-farming activity, whether on-farm or off-farm.

42% of farmers and their spouses are at most 'part-time' (many will not work on the farm), but getting a clear picture of the farm economy is difficult. 58% of farmers and their spouses work full-time on the farm, but in no size class of farm is the proportion of family farm income from farming more than 40% - it is less than a quarter in the case of farms <40ha.

Other data from the same report suggests that the major sources of non-farming income in order of importance are: 'off-farm income' (1/3 of holdings); rents other than tourist; processing and retailing; contracting; tourist accommodation (fewer than 20%).

The High Nature Value of the area

- The overwhelming proportion of semi-natural habitats are 'upland' plant communities – blanket bog, wet and dry heath and acid grasslands
- Few inbye habitats have survived intensification, making the surviving ones, more valuable



Priority semi-natural habitats in the Dartmoor region – English Nature data

Dartmoor's blanket bogs are some of the southernmost in the Northern Hemisphere. The *Calluna vulgaris – Ulex gallii* dry heath communities are rare outwith Britain and Ireland. The structure of vegetation on these habitats is heavily influenced by livestock grazing.

Significant species include the southernmost nesting dunlin Calidris alpina in Europe. The Annex II marsh fritillary butterfly (*Euphydryas aurinia*) is found on wet pastures with Succisa pratensis whose structure is maintained by grazing. The national priority high brown and heath fritillaries (*Argynnis ardippe, Melitaea athalia*) and other declining butterfly species are found on brackeny slopes, which are the interface of open and wooded habitats; while grazing is not essential for the maintenance of this habitat in the short term, it prevents it eventually reverting to closed woodland.

Only about 20 ha of species-rich hay meadow communities survive.

Mapped data from Natural England's online MAGIC maps shows how rare semi-natural pastures of any sort are outwith the moorland core of Dartmoor, even in inbye areas within the DNP.

The time line

Explaining the present with the past

An overall view of the time line

1000 CE | 1700 CE | 1939 CE | 1990 CE

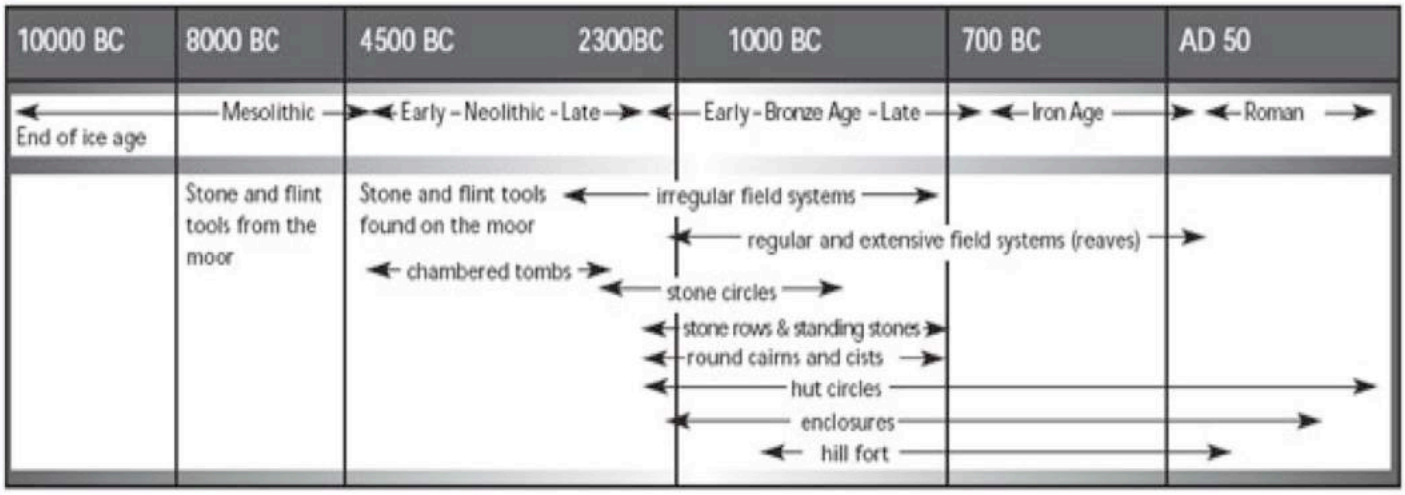
Prehistoric settlement → Mediaeval transhumance → Age of 'improvement' → Production support → Marginalisation or new purpose?

Prehistory

Farms on the high moor; subsequent abandonment

Pre-history - Roman

- Grimspound Bronze Age settlement – 24 huts within a protective enclosure



Settlement of the high moor reached a crescendo in the Bronze Age – one never attained since and followed by a period of abandonment, as witnessed by the survival of extensive Bronze Age remains to the present day.

By about 2000 to 1500 BC most of the tree cover had been cleared and Dartmoor had become an important area for the grazing of sheep and cattle. People lived either permanently or seasonally in circular stone huts whose remains can be seen on the moor. Some are associated with small, irregular fields, some lie within stone wall enclosures and others are in amongst large areas of rectangular fields known as reave systems.

Reaves are low, stony, earth covered banks which were built around 1200 BC to divide all but the highest parts of Dartmoor, first into territories (a little like our present day parishes), and within those into long, narrow, parallel fields. Their main function was probably to control the movement of stock, but there is some evidence that prehistoric people were also growing cereals here.

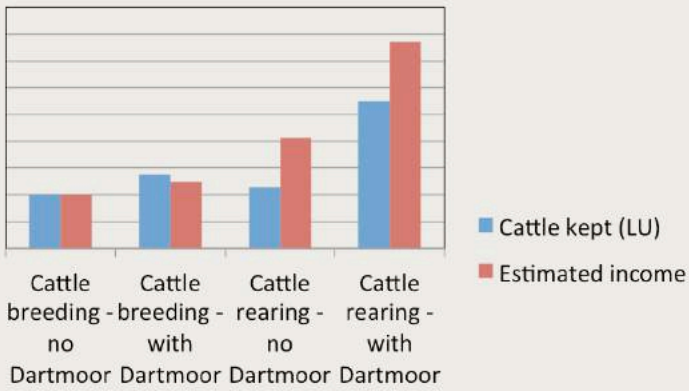
A climatic deterioration and the spread of peat during the first millennium BC (1000 - 1 BC), both resulting in poorer grazing vegetation, contributed to the abandonment of the higher part of Dartmoor during the later prehistoric period. Land use on the moor in Late Antiquity is something on which we have very little information.

Medieval Times

Regional and local transhumance; gradual piecemeal enclosure

A resource for the whole county

- South Devon cattle on the moor – descendants of the medieval cattle types



- Impact of having access to Dartmoor for Harold Fox's imaginary Devon farm, showing cattle breeding and rearing scenarios

Dartmoor at this period was a grazing resource for the whole county of Devon, particularly for cattle in summer. Somewhere around early mediaeval times, there was a shift from seasonal transhumance involving the livestock owner and milking stock to one where animals from more distant locations, mostly non-milking, were sent to the moor to be cared for by 'agisters', who were tenants of farms in the heart of the moor – the so-called 'ancient tenements'. Farms from parishes adjoining the moor also had rights to use certain grazings. A complex system of fees grew up to pay for the agisters' work and to regulate the use of the moor by outsiders.

Harold Fox, an historian, shows how beneficial it would be to an imaginary lowland Devon farm to be able to send drystock to the moor in Medieval times. Technical limitations to production on the home farm and the need to provide room for grazing draught animals and for the production of winter keep made the moor's burst of summer growth into a real boon, worth walking the animals miles for. It is estimated that perhaps 10,000 bullocks and young stock were grazed on the moor each summer in this period.

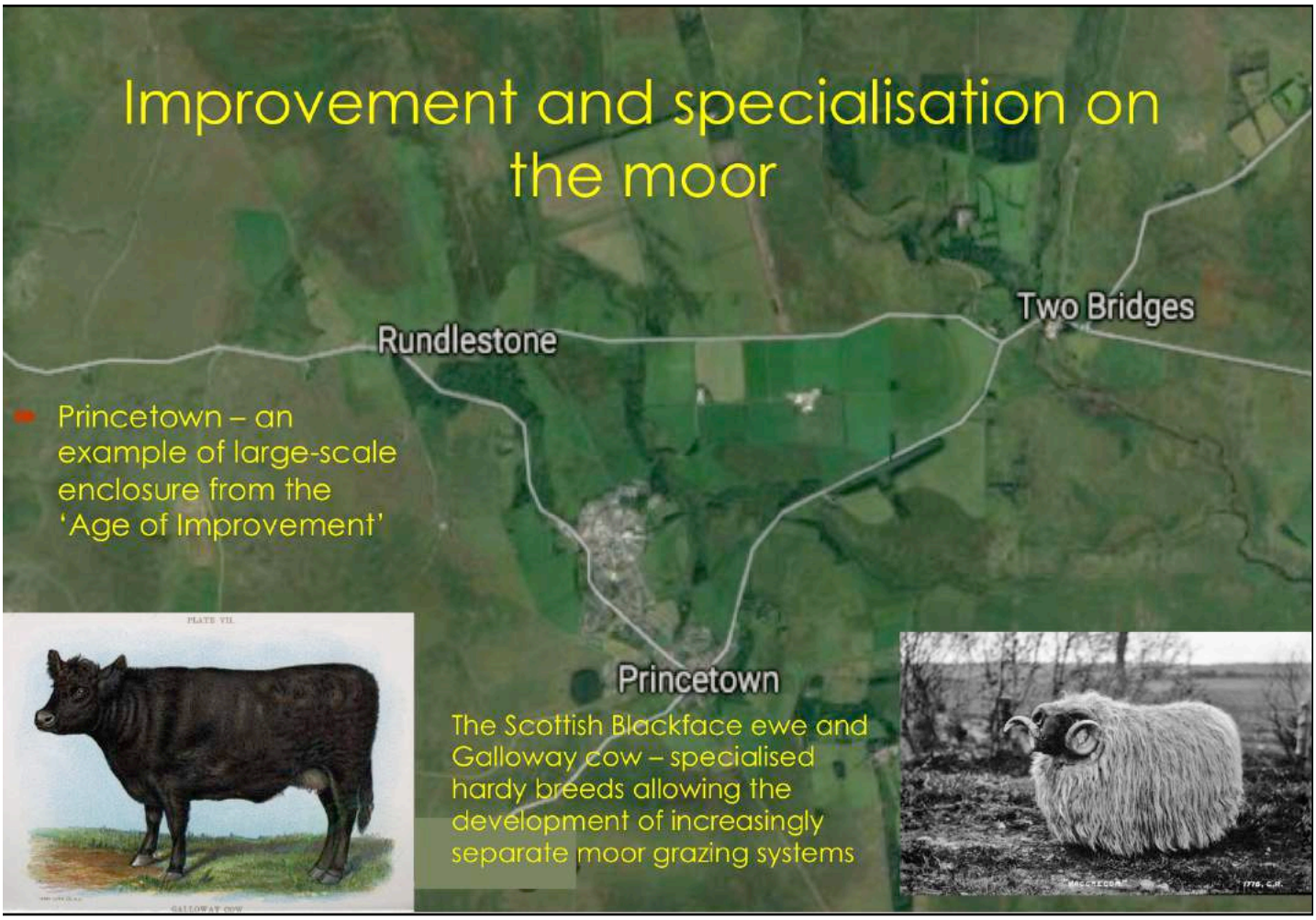
At the same time, it is likely that sheep were the most numerous type of livestock on the moor. Wool was a source of great wealth in the county, not least for the local monasteries. The emphasis on wool led to the keeping of wethers, many of which were, it seems, outwintered. The dominant hill sheep type kept for its wool developed into what became known as the white-faced Dartmoor breed.

Goats and sheep were present, but were frowned upon, at least in later years. Ponies were certainly present, but there is little detailed information on their numbers etc.

Enclosure was limited in its effect. The Crown, the major landowner, had its own hunting interests, and the moor had an important tin mining industry throughout the mediaeval period. The tenants of the ancient tenements were allowed to enclose limited areas of land, but they also had a financial interest in keeping lowland cattle summering on the moor, since their own farms were in any case limited in terms of winter keep.

Late 17th to early 20th centuries

The 'Age of Improvement' and specialisation; responding to growing markets; the growth of non-farming stakeholders; depression



The Enlightenment and resulting industrial and agricultural revolutions had massive impacts on Devon agriculture, and thereby on the use of Dartmoor's commons. It is not clear to what extent developments on the moor were a reaction to changes on the lowland or were positive developments happening in parallel to them; for convenience we separate them here, but it must be stressed that they were all inter-related.

As elsewhere in the UK, there was a drive for the inclosure (privatisation) of common land. A new settlement, Princetown, was founded in 1785, and a substantial area of the surrounding moor enclosed and improved. Progressive inclosure eventually led to a public backlash (see following slides).

A new approach to the rational use of the moor led to the introduction of specialised, hardy, cattle and sheep breeds from Scotland, notably the Blackface and the Galloway. Even breeding animals of these breeds could be outwintered, weakening the link between moor and inbye and between Dartmoor and lowland Devon (though summering lowland cattle was still common in the 1920s), but potentially strengthening the autonomy of the hill farms. In the case of the Blackface, the wool was of low quality; production put more stress on the lamb, sold store off the moor.

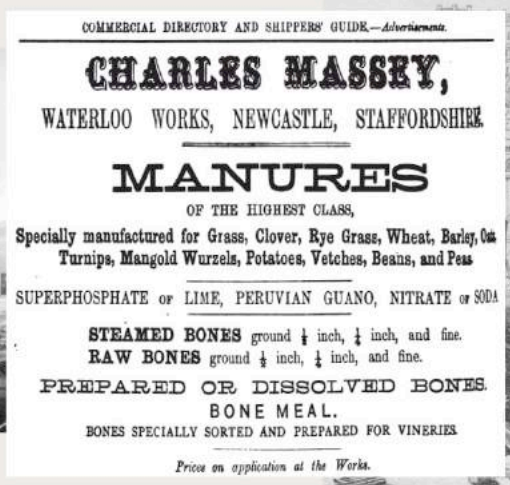
Expanding markets for ponies

- The huge growth in coal mining in the UK to almost 300 million tonnes by 1914 was almost all produced using horses
- The Polo Pony Society was founded in 1893, reflecting the interest in that sport, imported from India, and leading to a deman for ponies for that purpose

While it is not clear what the historic numbers of ponies was, it is clear that by the end of the 19th century they numbered at least 30,000. The trade in ponies was dominated by the needs of the UK's coal mines, but Dartmoor animals were also favoured by the wealthy classes as polo ponies.

Interestingly, the distinct characteristics demanded by those two markets set in place a split in the 'breed' between hardier and more fancy types which is still seen today. "Just over one hundred years ago, the pony breed showed a split into two categories. One group began to concentrate on breeding for the show ring (where appearance is most important) and the other group work on breeding for purpose (where adaptability and suitability for work is most important)." Note that this had already happened by the time the Dartmoor Pony Society was founded in 1925.

Expanding opportunities for lowland systems



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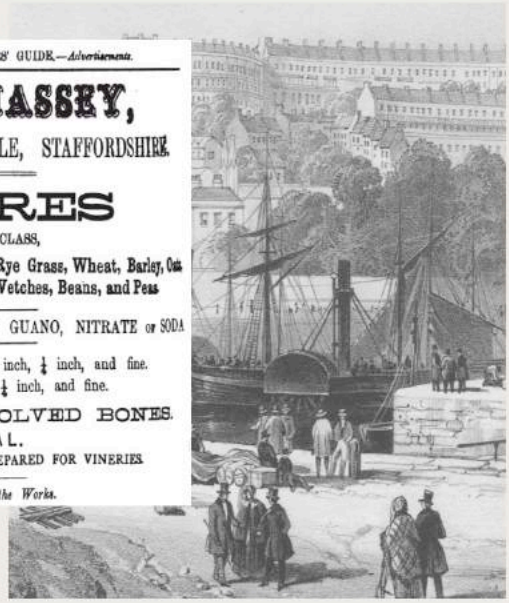


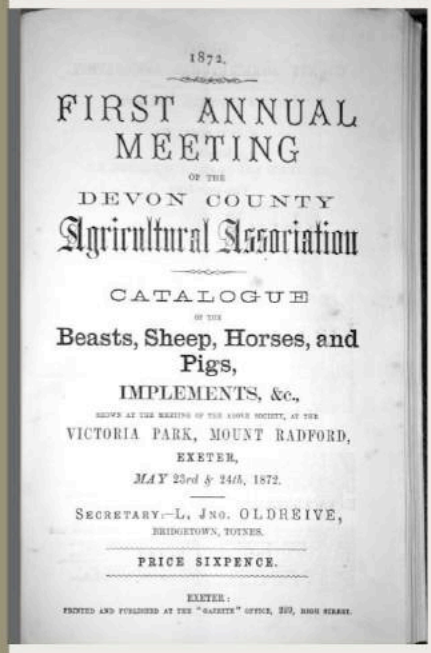
- The railway arrived in the region in the late 1840s, connecting it to the booming markets of Bristol and London and allowing access to the fruits of science and trade, not least fertilisers

Devon was fully connected to industrial Britain with the arrival of the railways to Bristol, London and beyond in the 1840s and 50s. There was now easy access to these burgeoning markets (Bristol grew from 68,000 in 1801 to 323,000 in 1901; London from 1 million to 6 million in the same period).

The speed of travel allowed the development of regional specialisation – Devon's lowland pastures were ideally suited to dairy farming. Lowland systems were developed which were more difficult to fit into the traditional transhumance pattern.

Previous limitations on stocking rates (and therefore nutrient cycling/input) on the lowland were loosened by the advent of imported fertilisers (natural and manufactured); eventually the advent of mechanical traction would free up the land formerly dedicated to draught horses.

Innovation in lowland systems


1872.

FIRST ANNUAL MEETING

OF THE

DEVON COUNTY

Agricultural Association

CATALOGUE

OF THE

Beasts, Sheep, Horses, and Pigs,

IMPLEMENTS, &c.,

HELD AT THE MEETING OF THE ABOVE SOCIETY, AT THE

VICTORIA PARK, MOUNT RADFORD,

EXETER,

MAY 23rd & 24th, 1872.

SECRETARY:—L. JNO. OLDREIVE,

BRIDGETOWN, TOTNES.

PRICE SIXPENCE.

EXETER:

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- Local livestock types were formalised into ever more specialised 'breeds', such as the Dartmoor greyface sheep, with breed societies for their promotion and protection
- A Devon Agricultural Association was founded in 1872, running an Agricultural Show to promote good quality livestock
- Money was set aside for an agricultural college in 1903; Seale Hayne was founded in 1920

Innovation both led to and was led by a plethora of improvement societies. The old types of livestock were converted into new formal breeds by cross-breeding and selection. A new lowland wool breed, the Dartmoor greyface, was developed, for example. At the same time, these societies, once formed, also promoted a certain stifling of innovation - the Devon Cattle Breeders Society was formed in 1884 'to promote and *maintain the purity* of the Red Ruby Devon breed.'

The Devon Agricultural Show was started in 1872 by a dedicated County Agricultural Association. The aim was to promote agriculture in the county; the first show had 500 animals entered, mostly of the newly-recognised local breeds. But there were also 800 different items of new machinery on display.

Even the laissez-faire State had started to take an interest in the development of agriculture by the turn of the 20th century. A private bequest was made in 1903 to found an agricultural college, but by 1909, the Board of Agriculture had decided that this would be a way of furthering its objective of expanding the education of science and practice of agriculture in the South-West; after a delay due to the First World War, Seale Hayne Agricultural College was opened in 1920. It did not however provide much training on hill farming systems, with local students travelling to northern England for relevant experience.

The demand for better conditions in the growing towns around Dartmoor led to the construction of a series of water supply reservoirs on the moor.

Dartmoor had been used for military training exercises since the Napoleonic and Crimean Wars, being conveniently located to the major naval base of Plymouth. However in 1873, regular training started on the Dartmoor Training Area in the northern part of the moor.

Afforestation was another innovation – the first plantings were in 1862.

All of these, as well as insensitive quarrying of popular tors (granite exposures on the hilltops) and the continuing trend towards inclosure, provided the motivation for the creation of the Dartmoor Preservation Association in 1883. Whereas in previous times, Dartmoor had been thought of as a desolate and somewhat frightening wasteland, the 19th century saw the growth of a tourist industry and of interest in all aspects of the landscape, from archaeology to wildlife. Now even the 'wildness' was romanticised in The Hound of the Baskervilles. And the politically active middle classes set out to prevent all manner of 'undesirable' developments – quarrying in 1881; use of the military ranges on Saturdays in 1883; reservoirs from 1894 (for London!! But it also opposed reservoirs for local towns); inclosure in 1897 and afforestation in the 1920s and 30s.

Globalisation, shifting policy and depression

- Left: Decline in coal production from 1920 (as well as mechanisation) led to a collapse in the demand for pit ponies
- Above: SS Dunedin (sailed 1876-82) – the first refrigerated transporter of meat from New Zealand to the UK

Globalisation's impact came early to the UK. Domestic wool production suffered competition not only from Australian and Argentinian flocks, but from the booming cotton trade. And while the domestic meat trade remained dominant, the first refrigerated meat from New Zealand arrived as long ago as 1876.

UK coal production started its long decline soon after the First World War; combined with mechanisation underground, the result was a collapse in the demand for pit ponies.

Agriculture production was regulated and subsidised during the 1914-8 war, but the cost of subsidies and the artificially high price of food led to the wartime Agriculture Act being repealed in 1921. This led to an immediate collapse in prices. Though these subsequently recovered, the wider Depression of the early 1930s set things back again (though in dairy farming, it led to a structural shift to regionalised industrialised specialisation, which benefitted lowland Devon).

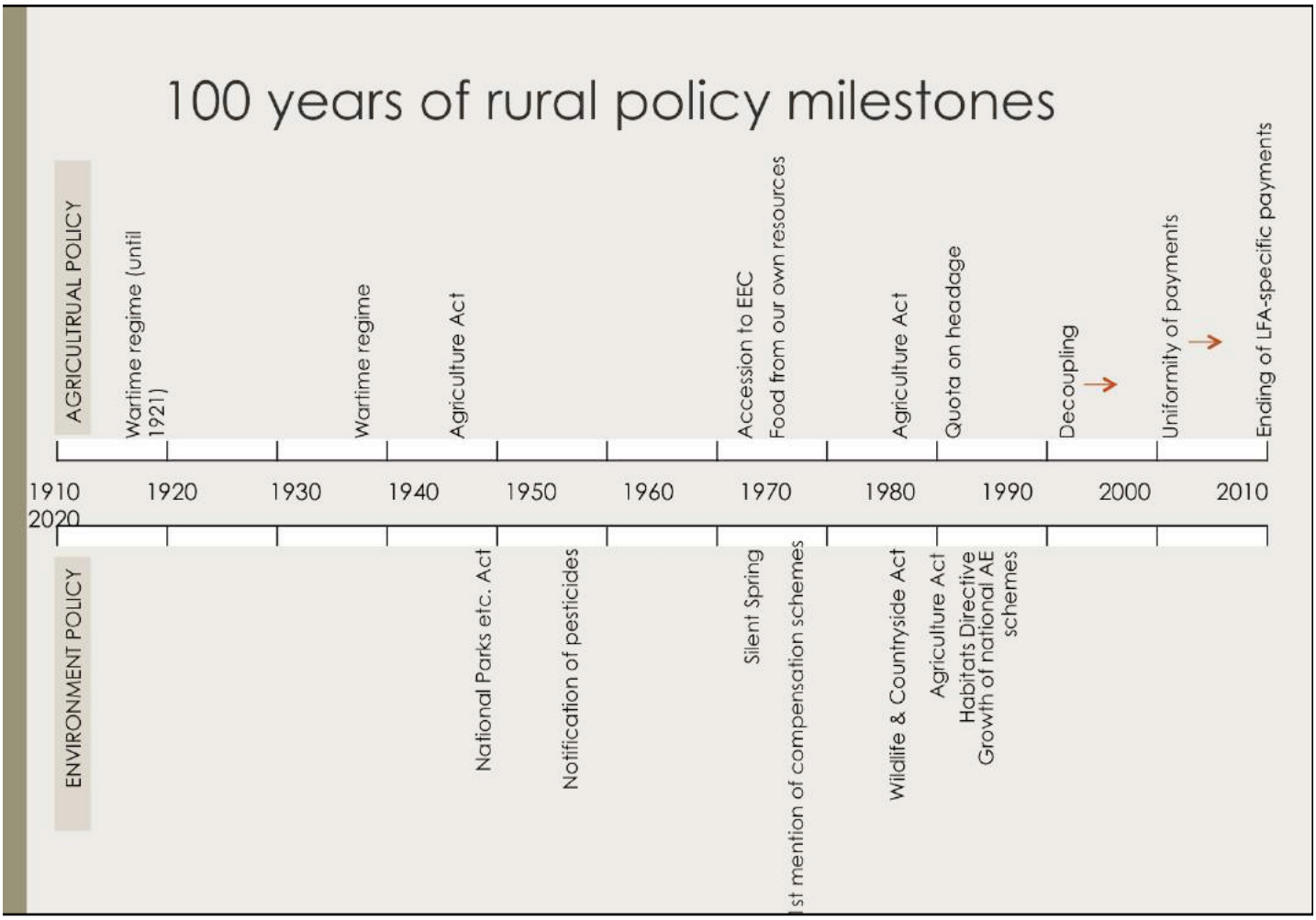
Agriculture didn't fully recover until the Second World War; the success of emergency State control during that period, as well as the memory of the recent hardships of the 1920s and 30s led to the new post-war redirection of policy.

The short answer is that we don't know, until well into the 20th century (and present-day memory). It is next to impossible to reconstruct either past grazing densities on the moor itself, whether or average or over the year, or the historic balance of various types of grazing livestock and how that changed over time. Moreover, we know that the responses of vegetation communities to those pressures are not simply reversible – effects that have been seen in recent years in response to major changes in livestock patterns may result in vegetation types which are nothing like any that have occurred in the past and the effects of reviving what are assumed to be previous practices may not be to resurrect the previous landscape.

We know also that some external factors have changed massively. On the moor, the presence of metalliferous mining, with its attendant population and pollution, is gone after hundreds of years. Airborne pollution levels have changed, even here in Atlantic SW England – acid deposition is thought to have exceeded the tolerance of blanket bog at times in the past, and nitrate deposition levels even now may be having serious impacts on upland habitats. Climate change is a factor which has had major influence in the past (leading to settlements being abandoned in the Bronze Age which were never resettled since, for example). It seems likely to impact on present-day habitats as well, with possible knock-on effects on management.

However, the survival of habitats and (probably) species into the present day illustrates that whatever the changes in terms of land cover patterns and land use intensity, there was, despite a history of seemingly constant intensive use, sufficient resilience in the landscape and sufficient refugia for species to allow it to respond to those changes (and the others in the wider environment) and 'recover' where necessary.

Failure to address the question of what favourable status looks like for Dartmoor's habitats and what systems are likely to deliver – or did in the past deliver – this condition is a major weakness of agri-environment policy and a source of great uncertainty for farmers.



The current concern (as evidenced by this project) to integrate agricultural and environmental policy into a coherent, realistic, objective-led whole is something very recent. 100 years ago, the very idea of long-term intervention in agriculture by the State was anathema – there certainly had been State control and direction during the First World War, but this was lifted again in the 1920s. Combined with the vagaries of monetary policy, it left agriculture open to a severe depression in the early 1930s.

After 1945, the effectiveness of wartime State direction and memories of the 1930s consequences of laissez-faire policy led to a huge change in approach from the new Labour government – one which has remained with us in some form ever since. The State intervened in agriculture in a multitude of ways. Efficiency and competitiveness were to be improved by free training, enhanced education and capital grants, with prices buffered by deficiency payments when agreed prices were not met in the market. Initially at least, the idea was that this would be a temporary policy, recongnising the lack of capital etc. in rural areas. However, even from the start the upland Less Favoured Areas were recognised as needing special (and ongoing?) help in the form of headage-based Hill Livestock Compensatory Allowances. Soon it became clear that the whole policy would have to be a permanent feature of rural life. Tariffs became an important part of the toolkit, so that by the time the UK joined the EU in 1973, its policies and the CAP were quite similar. Horses were not included in the new support framework, putting them into a policy vacuum where they remain today.

At the same time, technical development continued, in part independently of grants and payments. This period saw the final destruction of almost all of the semi-natural inbye grasslands as well as a huge expansion in the number of sheds and the quantity and power of agricultural machinery.

While joining the CAP in 1973 did not lead to an increase in total real terms price and direct financial support to farmers, it did lead to a large increase in production. A policy paper produced in 1975, after the UK joined the EU, was entitled 'Food from our own resources' (though the resulting intensive agriculture was in fact eventually became highly dependent on imported, often non-renewable, resources).

In the case of Dartmoor, the rise in sheep numbers was particularly stark – rising from 56,000 in 1972 to over 200,000 in 2002 (compare pre- and post-WW2 figures of 108,000 and 98,000). Numbers stabilised when quotas were introduced in the 1993 McSharry reforms, but at the new elevated level.

Up until the 1980s, there was hardly an environmental policy to speak of, especially in the field of agriculture. A landmark Act of 1949 set up National Parks and a Nature Conservancy (the first such agency) and designated good examples of habitats as Sites of Special Scientific Interest. However, the emphasis was not on the protection of biodiversity from agriculture, but rather on having somewhere to study ecology on a long-term basis, and having an body to do it. In the case of the Parks, the emphasis was on public enjoyment and landscape protection.

Environmental concerns started to impact in the 1950s in the field of agrochemicals, in part flowing from the work of the Nature Conservancy. But when awareness arose of the wider impacts of the 1970s and 1980s drive to increase production – the loss of habitats and declines in species on a massive scale – the impact on agricultural policy was minimal, thanks to the power of the farming lobby within and outwith Parliament and the civil service. The response was not to regulate agriculture, or steer it using the mainstream payments, but to compensate farmers for deviating not just from their current management but from their claimed future plans.

Agri-environment in England developed in this environment, but was surprisingly positively received from the start, despite the obvious tensions within the overall agricultural support framework – agri-environment paid for

Mid XXth Century:
UK support for the livestock sector

- Left: 'Revival of a rundown mountain farm' – a meeting of the National Agricultural Advisory Service
- Above: Bicton College – Devon's new agricultural further education establishment

Post-war legislation introduced price support in most sectors and headage payments for breeding ewes and cows (Hill Livestock Compensatory Allowances) in the less-favoured areas. There was support for a whole range of capital works and improvements, underpinned by free extension advice from the National Agricultural Advisory Service. And Devon got another agricultural college, this time at the more vocational 'further education' level – Bicton College. Interestingly, it has never delivered training on hill farming systems, neither has nearby Duchy College in Cornwall.

The CAP regime for present-day Dartmoor

- Pillar 1:
  - Basic Payment Scheme paid at 2 rates – moorland and the rest
  - No coupled schemes
- Pillar 2:
  - No ANC/LFA payments; no Natura 2000 payments
  - Agri-environment
    - Countryside Stewardship is the currently-open scheme. Operates 2 Tiers – high priority Tier 1 includes all common land on Dartmoor; criteria for accessing lower priority Tier 2 are in general not conducive to farmed land in the rest of DNP
    - There are still some legacy agreements in place from previous agri-environment schemes – Higher Level Stewardship and Upland Entry Level Stewardship
  - Other Pillar 2 instruments are hardly used at all to benefit Dartmoor farming, including HNV moorland systems

Parallel to the establishment of permanent State intervention in agriculture, but completely separate from it, the 1945 Labour government also introduced the National Parks and Access to the Countryside Act 1949. The National Parks – Dartmoor was set up in 1951 - were designated in order to preserve and enhance natural beauty and or to encourage the provision or improvement of facilities for the enjoyment of the National Parks and for the enjoyment of the opportunities for open air recreation and the study of nature afforded by them. This was partly to be achieved by means of the planning process and by targeted investment in facilities etc. While land purchase was permitted in some circumstances, land ownership within and existing land use within the designated area was largely left unchanged.

The same Act provided for the formation of a Nature Conservancy – the first nature conservation agency in the UK, though its powers were limited in practice – and for the formal registration of public rights of way.

Changing commons governance

- A perception that a lof of livestock management on Dartmoor was poor led local farmers' organisations to found the Dartmoor Commoners' Association in 1953
- While central Dartmoor had not previously been considered common land in the strict legal sense, the land was registered under the Commons Act 1965
- The Dartmoor Commons Act 1985, created the first Commoners Council in England for self-governance of the commons

In 1953, the Dartmoor Commoners' Association was formed as a federation of the commons associations, with the aim of:
- protecting and regulating the interests of all entitled to graze Dartmoor's commons, subject to the rights of the constituent associations
- taking all necessary steps as may be necessary to further those objects

It was considered that the quality and quantity of stock produced from Dartmoor had been falling for some time and that improvement could only be effected by coordinated control by the commoners themselves. The Association was therefore concerned with both the standards of animal husbandry and the quality of the grazings. Progress on the latter was thought to be limited, with allegations of poor husbandry practice emerging in the harsh winter of 1962/3.

In response, the Association produced a set of recommendations, subsequently adopted by all the constituent associations, called the Nine Point Plan:
- Culling of old ewes
- Autumn dipping of all sheep
- Culling of old and unthrifty cows
- Weaning of calves at reasonable age
- Provision of fodder as conditions warrant
- Voluntary attestation of hill cattle as being free from disease
- Keeping of whatever pony type which suits the commoner, providing they are hardy
- Proper feeding and watering of ponies in severe weather
- Paying closer attention to the breeding of stallions and limiting of their numbers

Problems persisted however - over-grazing and under-grazing, poor animal health and husbandry, the incorrect use of grazing by right holders and the abuse of rights were widespread. At the same time pressures of public access and increased recreation were rising and there was a need to legalize such access with appropriate controls. Thus in 1974 the Dartmoor Commoners' Association approached the Dartmoor National Park Authority expressing a wish to see discipline imposed by law.

This legislation took eleven years to pass and the Dartmoor Commons Act was finally enacted in 1985. It provided for the creation of a Commoners' Council, which came into existence the following year. The Council is largely composed of farmers who have common rights and who are elected from within their local community (see fiche), and in the wake of its creation, the Association went out of existence.

The Council has *to take such steps as appear to them to be necessary and reasonably practicable for the maintenance of the commons and the promotion of proper standards of livestock husbandry thereon (including the assessment of the number of animals which can properly be depastured on the commons from time to time); and in discharging that duty the Commoners' Council shall have regard to the conservation and enhancement of the natural beauty of the commons and its use as a place of resort and recreation for enjoyment by the public.*

In carrying out those duties, it can engage in a very wide spectrum of activities, including the setting of regulations and entering into management agreements. It must keep an up to date register of commoners and their rights.

1990 to present day

Multiple pressures; new approaches; marginalisation or renewed purpose?

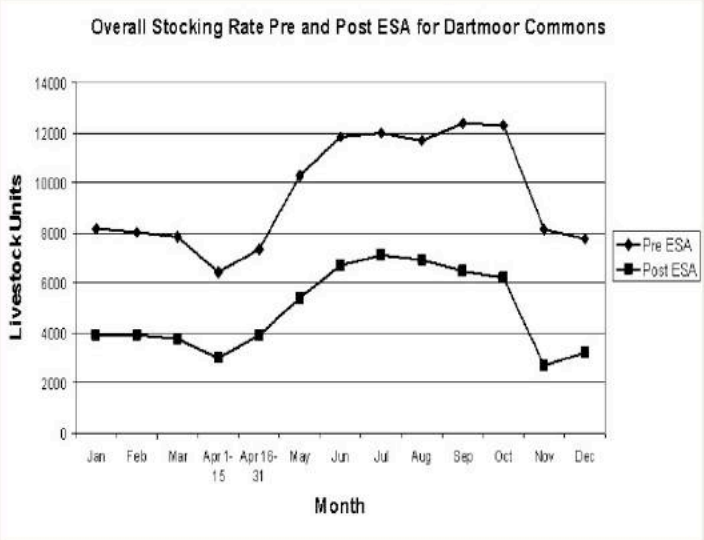
Although the designation of Sites of Special Scientific Interest had been possible under earlier legislation, the implications of designation for site protection was considerably enhanced under the Wildlife and Countryside Act 1981. Occupiers now had to seek consent before undertaking any one of a list of Potentially Damaging Operations. But while the State could enter into management agreements with occupiers, their logic was frequently based on compensation for not damaging the sites.

All terrestrial SACs under the Habitats Directive were, at least in England, underpinned by the SSSI designation (the UK never used the term SCI, even for sites still awaiting management plans). It took until well into the late 1980s and early 1990s for the legislation and designations to impact substantially on farming. Now there was to be no compensation for not damaging the site, while the authorities for the first time had a duty not only to protect the site but to define its Favourable Condition and to work towards achieving that through a management plan.

It could be argued that the main impact of designation has been to make it more likely that the moors will be targeted in agri-environment schemes, but even the full integration of these into a co-ordinated plan for improving site condition has proved surprisingly difficult; there are still no comprehensive management plans for all the sites.

Agri-environment

- First Environmentally Sensitive Area scheme under national legislation (before EU Regulation enacted)
- General trend since to national, less locally-adapted schemes, and to targeting to national priorities
- On the moor, agri-environment has been rather a 'one-trick pony', with tools primarily geared to overgrazing issues.
- Big success in reducing stock numbers, but less successful in promoting a positive vision
- Dartmoor Farming Futures pilot developed to increase local relevance by focus ing on outcomes

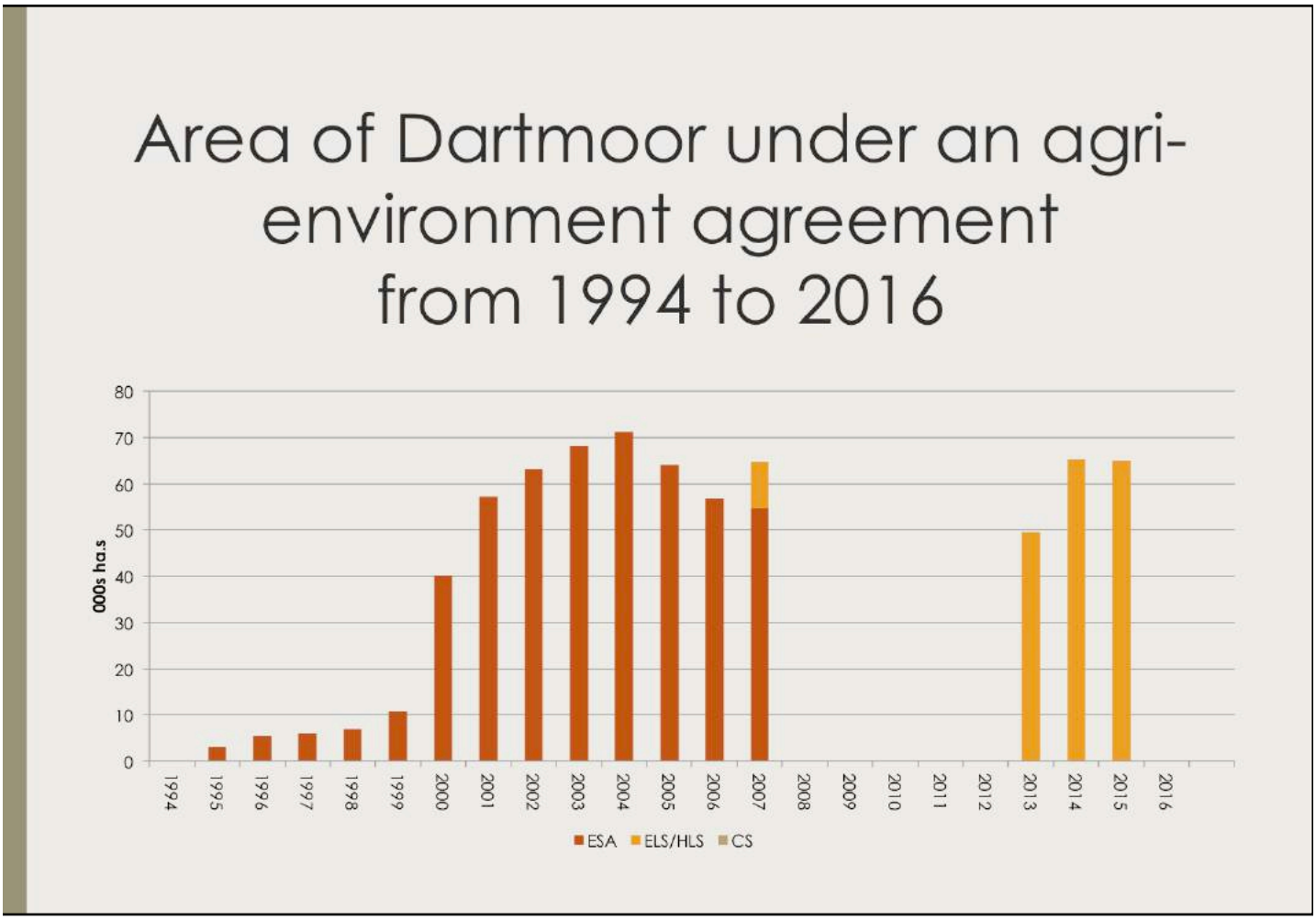


In 1987 the first pilot Environmentally Sensitive Area schemes were launched and in 1994 the Dartmoor ESA scheme was made available to all farmers on Dartmoor. Cross compliance, introduced alongside the quota in 1992, had started to drive livestock numbers down to a more sustainable level and was applied in those areas where over-stocking was evident. The ESA was offered, in part, to compensate for the stock reductions, and take up, slow at the start, was soon impressive, with almost 80% of the eligible land under an agreement by 2004.

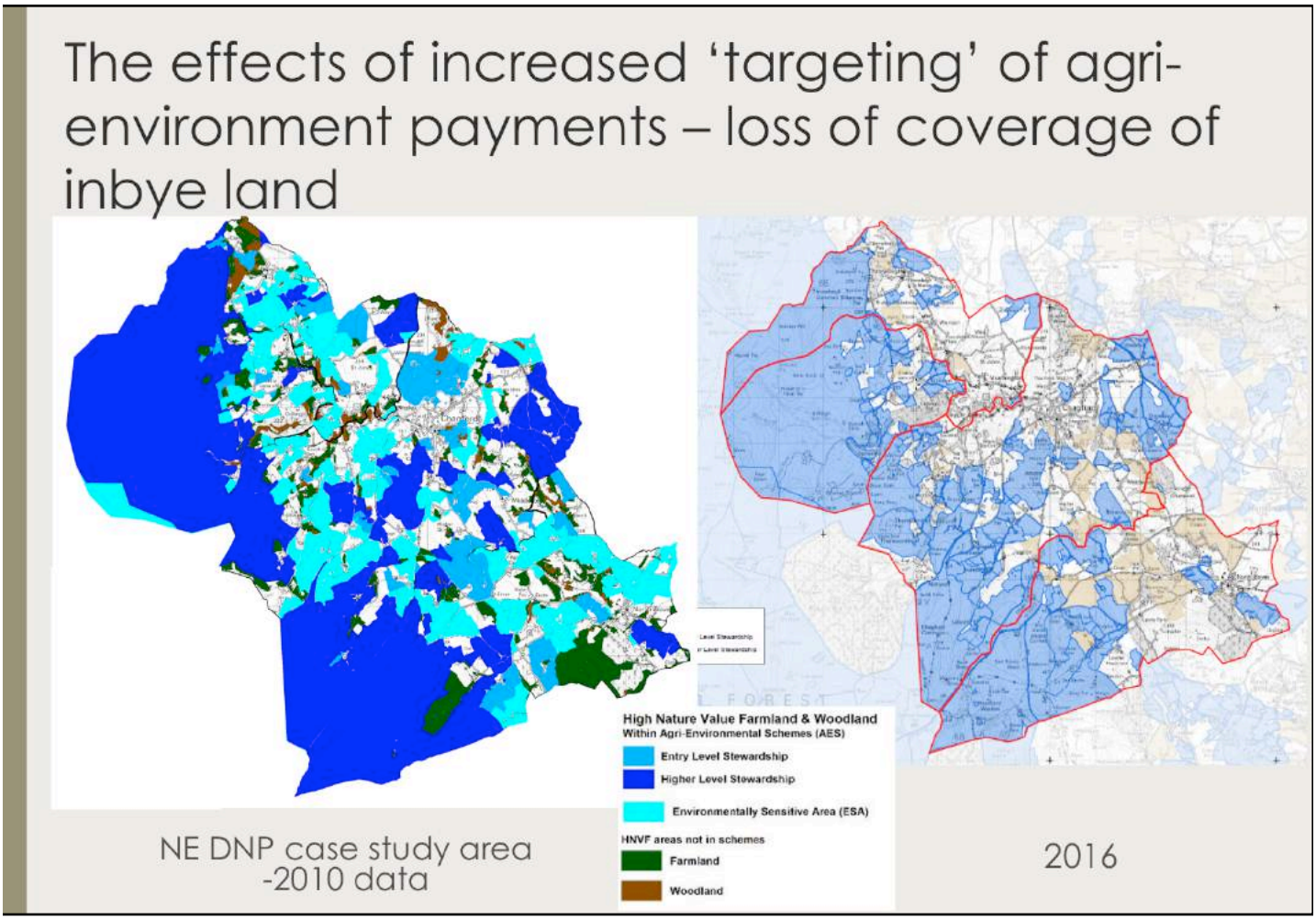
The ESA and subsequent schemes (Environmental Stewardship and Countryside Stewardship) all sought to reduce stocking levels, especially for sheep. There was a focus on heather recovery and sheep, and to some extent cattle, were thought to be preventing heather recovery due to the grazing of new heather shoots in the winter, so most agreements were predicated on winter stock removal or a significant reduction in numbers.

One of the most significant benefits to arise from the AE agreements was the reduction in wild fires. Whilst the threat of penalties for those suspected of starting a wild fire increased for those party to an agri-environment agreement (and especially when cross-compliance was introduced as a condition of receiving direct payments), the training encouraged by the agreements together with a fire plan being required to accompany each agreement has contributed to a marked reduction in the number of fires. Commoners are now trained to work alongside the fire fighters and capital items such as foggers can be purchased with AE money.

Concerns over the effectiveness of current prescriptive, management-based agri-environment models led to the innovative Dartmoor Farming Futures pilot project in 2004/5. The project:
- Offers farmers and landowners more responsibility for the design and delivery of agri-environment schemes;
- Focuses on the complete range of public benefits (ecosystem services) that are associated with upland farming (from food production to carbon sequestration) and identifies priorities for particular spatial areas; and
- Facilitates a collaborative approach to agreeing the outcomes sought, delivering the management required and assisting with the monitoring of the process.



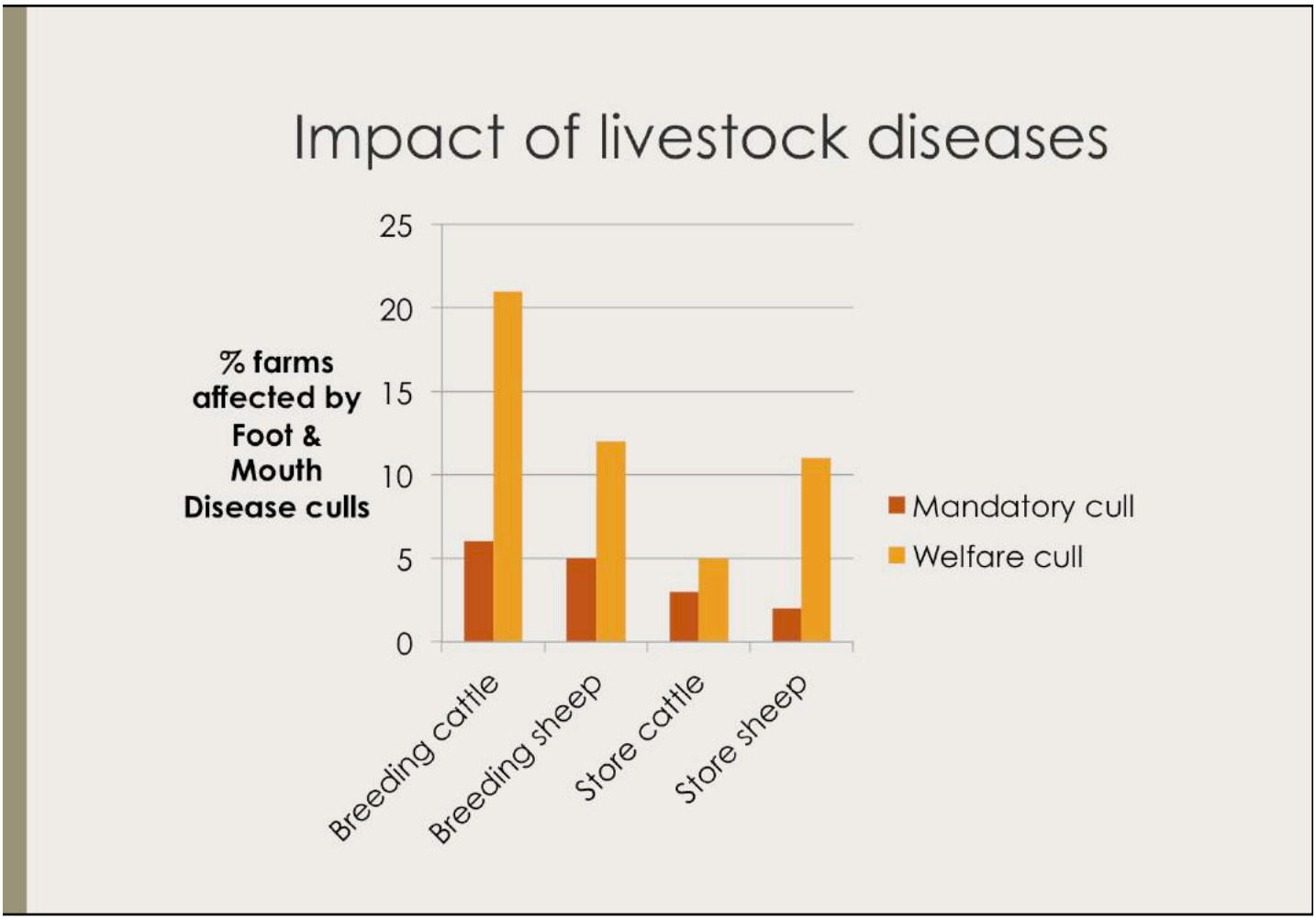
Graph to be completed



The trend in recent years has been firstly towards fewer and fewer schemes and then towards ever-greater 'targeting' of schemes. Support for the uplands used to be delivered by LFA and agri-environment measures (themselves regionally differentiated in their first incarnation, later being split into a more general level and a higher level for priority areas).

More recently, both LFA and the upland entry level agri-environment meant to replace it have been abolished, and while the current agri-environment scheme (the only Pillar 2 area payment now available) has in theory got a high and a medium priority targeting system, only the former seems to be accessible in practice for farmers in DNP.

The result is that common land in Dartmoor remains in schemes and is able to access new contracts when the old ones expire, other land is gradually falling out of AE as old Upland Entry Level Stewardship contracts come to the end of their lives.



The extensive grazing of the commons is considered by most farmers to be a healthy place for their stock. The exception is the tick borne diseases, particularly red-water fever, that affect cattle that are new to the moor and have little resistance. The really significant impact of animal diseases is most usually apparent when livestock are wintering away from the moorland in sheds, or lowland fields where they are more likely to come into contact with infected livestock and wild animals. The impact in recent years of animal disease, especially bovine TB and control regulations on moorland farms has been huge.

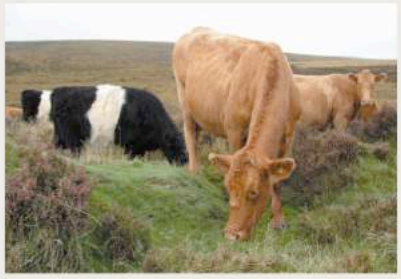
In early 2001, Foot and Mouth Disease (FMD) was recorded on a farm in the north of England; by March of that year, it had been reported in Devon and before long many livestock farms had all their cattle and sheep culled. The loss of herds and flocks that were hefted to the moor was an additional burden for the hill farms on Dartmoor and many farmers considered giving up farming. After the outbreak was almost all affected farmers continued to farm although the replacement of culled animals was for some farmers an opportunity to change breed type and make changes to their farming system. The impact of this disease outbreak was very significant and the real fear that farmers would abandon the moorland led to several studies intended to help the farmers remain, leading directly to the Dartmoor Vision and indirectly to initiatives such as the Hill Farming Project and Farming Futures.

Dartmoor, and the rest of Devon, is in the high risk area for bovine tuberculosis (TB). The direct impact of this disease on cattle is significant, but so also are the consequent restrictions on cattle movements, including between common land and the farm. In addition, such a high risk area has a complex testing regime, the burden of which impacts on the number of cattle on the moorland. In 2010 a survey of farmers in SW England, including Dartmoor, established that 75% of hill farmers had been under TB restriction at some time during the previous two years. At that time there were over 500 TB restricted herds identified in Devon. When under restriction farmers are unable to sell their cattle and calves through the usual livestock auctions and markets. The farmers may have to retain their cattle on the farm until the animals have tested clear. This situation has led

Ironically, most of the key players in disease control locally now recognise that the commons are the area of lowest infection and transmission risk, so a control system which keeps livestock inbye works against biosecurity. To enable the state veterinary inspectors to carry out a risk based analysis for each common, a TB Control Plan has been designed and implemented for each common on Dartmoor. This has reduced the potential testing burden whilst ensuring the cattle were not subject to increased risk of exposure to the disease. It is however a continuing struggle to keep an awareness of the special circumstances of common land use alive in the mind of senior administrators centrally; for them, simplicity and uniformity too often seem to be ends in themselves.

TB has had some impact on farming systems, for example, in encouraging farmers to finish livestock at home instead of depending on a strategy of selling store cattle, which could be heavily impacted by movement restrictions and where the presence of TB in the area will reduce the number of potential buyers.

Livestock numbers on the moor today



- Cattle:

Late summer peak number = 5100

Few (c.50) winter on the moor

(10,000 in 1985)

- Sheep:

Mid summer peak number = 26,000

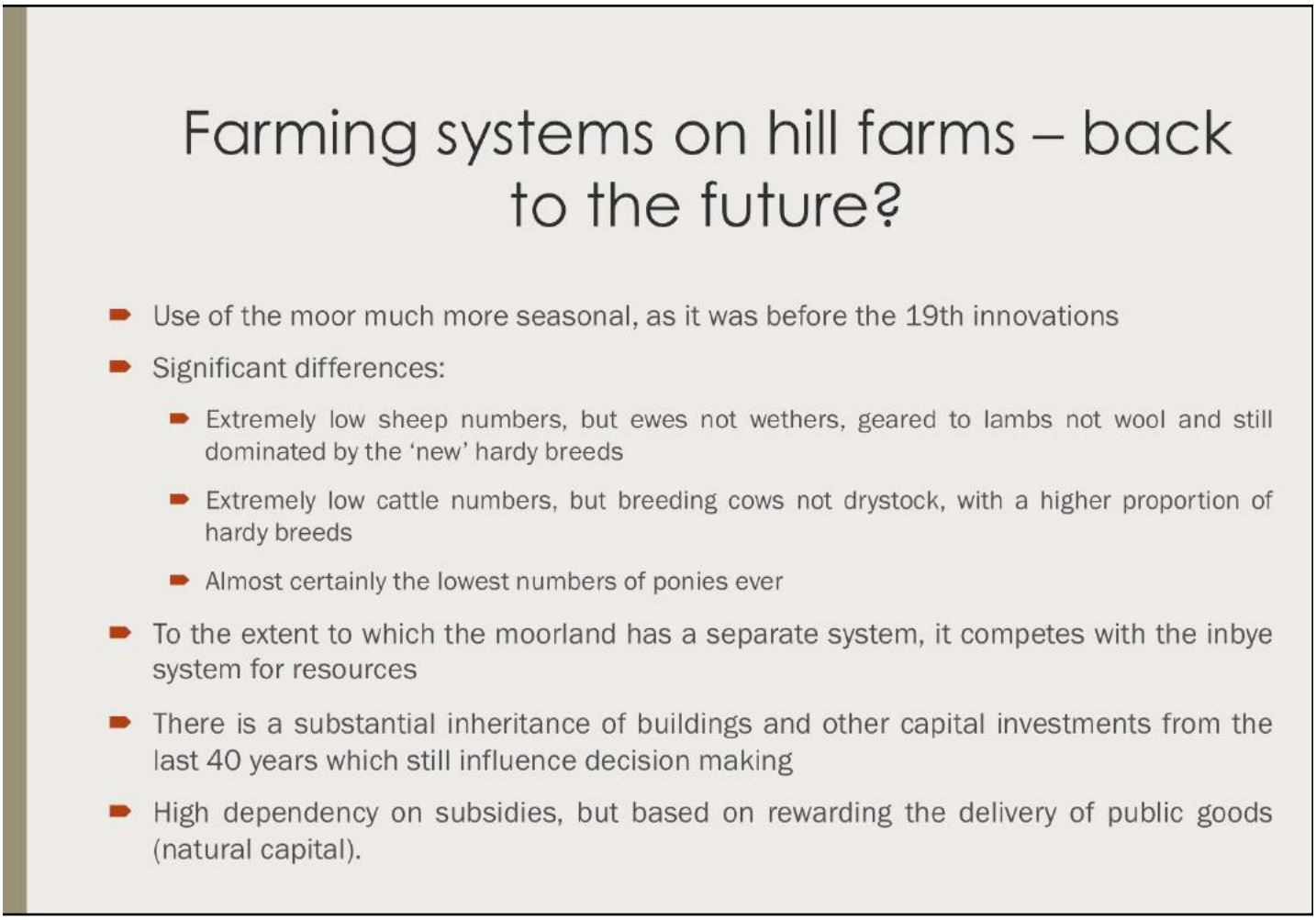
Wintering number approx. = 10,000.

(51,188 in 1985)

- Ponies:

Present all year =1200.

(2,250 in 1985)



In some ways, the situation created by agri-environment schemes and decoupling of direct payments (there is no LFA/ANC scheme in England) seems familiar – a much more seasonal system than had developed in the early 20th century, harking back to the previous traditions of transhumance.
However, the current system is different in some important ways:
- Total numbers of sheep on the moor are at an all-time low, and is dominated by ewes rather than wethers
- Total numbers of cattle on the moor are at an all-time low, and is dominated by breeding cows rather than drystock
- Number of ponies is extremely low, with clear impacts visible on the vegetation they formerly kept in check
- Proportion of hardy, low-productivity breeds depastured on the moor much higher than in old system

There has been intensive management of the inbye system (and its infrastructure), so that the common is less of an opportunity for cheap summer pasture for animals which are part of the most productive system on the farm and more of a low-productivity competitor for scarce and/or expensive winter resources (see below)

There is little incentive for change. The capital investment made under different circumstances to house cattle in winter has in some instances reduced the desire for new approaches or alternative farming systems.

Summer grazing of cattle on the moorland and winter destocking of sheep requires alternative housing or grazing during the winter months. Increasingly the cattle, and to some extent sheep, that graze the moorland are additional to the animals kept on the farm inbye, often for finishing. When livestock leave the moor, there are a number of options (inwintering using farm-produced fodder; inwintering using bought-in fodder; away wintering…), but all of these have a cost, including in some cases the opportunity cost of not using those resources for the inbye livestock further afield onto rented grassland or, in the case of cattle, into specially-erected buildings.

The focus on the high ecological value of the moorland has repeatedly seen each generation of agri-environment schemes targeted to the moorland. Achieving the prescriptions required by these schemes has often come at a cost to the farm land around the moorland. These farms, providing grazing livestock on the common land often have separate flocks of sheep and herds of cattle separate from the moorland stock. The farm stock are usually animals with the potential to be finished (fattened) on the farm; a more profitable practice and one that can reduce the adverse impact of animal disease, especially bovine TB. However finishing stock comes at a price and requires intensification of the grassland resulting in impoverished environmental condition.

The farms are highly dependent on subsidy. Formerly a significant fraction of those were linked to livestock numbers; now they are all decoupled. It is likely that farmers are having to make decisions as to whether and how to cross-subsidise the various system on the farm, but the details of these considerations are far from clear (and worth investigating).

If grazing the moorland is not financially viable then farmers will eventually focus on their farmland and the moors will be under-grazed. This is beginning to happen. Link back to decline in animal numbers = increase in vegetation that soon becomes less palitable which increases change whilst causing some areas to be over-grazed. Nitrogen deposition may be exasperating the situation and working against heathy plants.

Molinia caerulea is a vigorous deciduous grass only palatable in the spring (May/June), which tends to grow into tall tussocks which come to dominate large areas of wet moorland if left unchecked by cattle or pony grazing.

Ulex gallii is a characteristic plant of western heathlands for which Dartmoor is of global significance. However, if left ungrazed its hummocks expand until they take over almost the whole area, shutting out further grazing and becoming a fire hazard. In the past, areas with lots of gorse were favoured as lears for ponies, since it would maintain them over winter. The collapse in pony numbers is likely to lead to a significant expansion in areas of rank gorse.

Pteridium aquilinum is not palatable to livestock, but is useful as livestock bedding. It is susceptible to control by trampling. Destocking, especially of the heavier cattle and horses, coupled with a reduction in the area mown for bedding, has led to an expansion in the bracken area and to the vigour of the bracken. Bracken areas do have some conservation value, not least for some are butterflies, but the wider issue, as with the other dominant species, is the apparent lack of vision and objectives for land cover and land use.

The post-war state National Agricultural Advisory Service was rebranded as ADAS in 1971 and was privatised in 1997 and worked only on twelve themes, of which only animal health had any relevance to livestock farming. The loss of a comprehensive advice provision for hill farmers was a significant blow; in 2002 a farmer survey on Dartmoor found that 30% thought the availability (or lack of) appropriate advice was a major issue.

The survey of Dartmoor's farmers in 2002, commissioned by the DNPA was a pivotal moment for farming on Dartmoor. The DNPA required information and evidence to ensure that farming within the National Park continued whilst recognising the significant challenges that the agricultural industry faced; lack of policy support, struggling farm businesses and tourism damaged by the recent outbreak of foot and mouth disease (FMD). Along with the findings previously mentioned the recommendations included developing the "Moor Futures" initiative to address many of the problems facing hill farmers that were identified during the survey.

The DNPA had promoted "Moor Futures" as a description of a range of initiatives targeted at and for the benefit of hill farmers. In response to the recommendations the Moor Futures developed into two initiatives, including the formation in 2003 of the Dartmoor Hill Farm Project (DHFP) with a specific remit to offer advice to hill farmers. [The other strand led to the Moorland vision and Dartmoor Farming Futures - see Vision, below.]

Part of a wider suite of three similar projects in the South West uplands, the DHFP was funded under the 2007-13 Rural Development Plan and by contributions from the DNPA, Duchy of Cornwall, The Prince's Countryside Trust and the now-defunct Regional Development Agency. The broad objectives of the DHFP have been:

- to bring about improvements in the competitiveness of each individual livestock sector to help them compete in the marketplace
- to assist farmers in meeting their changing responsibilities and facilitate improved animal health and welfare
- to provide support for farmers in enhancing the efficiency and effectiveness of on-farm management

Current DHFP activities include:
- Acting as a central hub for Dartmoor farmers for a wide range of enquiries and assistance
- Sending out regular newsletters with relevant information and topical issues to 400 farms
- Offering information, advice and signposting on funding and training
- Organising training and farm walks and talks for farmers on Dartmoor
- Organising study tours to see best practice elsewhere
- Developing projects to benefit Dartmoor farmers and support the farmers to develop their own projects
- Supporting farmer networks, such as the Dartmoor Women in Farming
- Development of Moorskills, an apprentice training scheme for young farmers

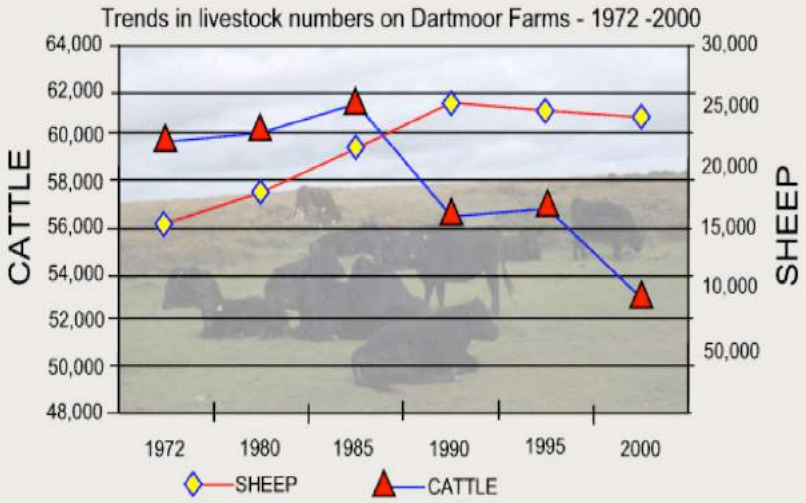
Unfortunately, when it came to funding, the Project has been treated as just that – a time-limited 'project' rather than an essential on-going service for Dartmoor farming. Rural Development funding finished and the project had to depend on the DNPA, charitable trusts and funds (again, 'project'-related) from the state lottery. The result is a cut in funding in real terms and a scaling back of its activities.

Further information and newsletters at this and associated web pages:
http://www.dartmoor.gov.uk/livingin/li-hillfarmproject

The business as usual scenario

(unlikely)

- High reliance on support
- Fewer grazing animals on the moorland, and possibly fewer active graziers
- Significant changes (adverse) to the moorland's vegetation and biodiversity
- Further intensification of home farm and enclosed land where feasible, but few areas left where this is possible



Data from 'The State of Farming on Dartmoor 2002 - The University of Exeter

Brexit means change is inevitable...

Possibly, further uniformity of policy, often inappropriate to moor
Possibly, continuing lack of clarity on desirable stock numbers, mix etc.
Possibly, further separation of inbye and moor system
Possibly, more marketing of produce but with what safeguards?
Possibly, continuing vegetation change
Possibly, continuing lack of advice & appropriate education and moor-relevant narrative of 'good farming'
Possibly, continuing policy limbo for ponies
Possibly, loss of critical mass for various services etc.

The immediate crisis – what world post-Brexit?

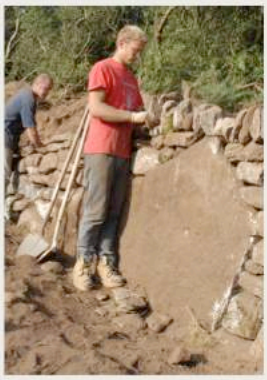
- Possibility of tariff and non-tariff barriers to trade with the EU
- Possibility of lower tariff and non-tariff barriers to trade with global competitors, particularly New Zealand lamb
- High probability of loss of direct payments
- All ongoing financial supports potentially put into agri-environment
- Agri-environment itself likely to be 'targeted', possibly so tightly as to exclude even inbye on hill farms

It has been calculated that trading with the EU at WTO tariff levels could add up to 40% to the cost of lamb exports. Lamb imports from New Zealand are already a focus of loud complaints; in a free trade agreement, the UK could be tempted to free up import controls and tariff barriers, further increasing the competition in the UK domestic market.

In the UK, and England especially, the narrative seems to have moved firmly to one where no direct payments are available as of right; their importance to farm output and especially to net income on hill farms on Dartmoor was demonstrated previously.

Payments for services would seem to be the main focus of discussion on policy going forward. However, Dartmoor's experience shows not only how innapropriate and ineffective some of the existing models traditionally used in England can be, but how 'targeting' – likely to be another major theme of policy – can lead to the exclusion of all but a small proportion of the farmed countryside, even inside a National Park.

The social and rural development driving forces



- Continuing high desirability of living and retiring in Devon and of commuting from rural villages to work in the towns and of rural homes with 'paddocks' – affordability continues to drop
- Continuing growth in rural tourism but with minimal benefit to farming on the moor

At least 4 important issues –

1. increase in recreational activity = impact on farming/stock.
2. Ever more unaffordable housing = less people to work on farm & succession
3. tourism impacts but no reward to farmers for disruption etc. and
4. high land prices prevent young farmers starting up their own business.

Also significant is the poor internet service, which reduces employment opportunities

The economic driving forces: food chains and markets

- Continuing reduction in consumption of red meat (esp. lamb) in favour of white meat
- Lack of differentiation of product produced locally and especially of meat produced extensively
- Continuing domination of agri-food business in meat food chain; low impact of farmer groups

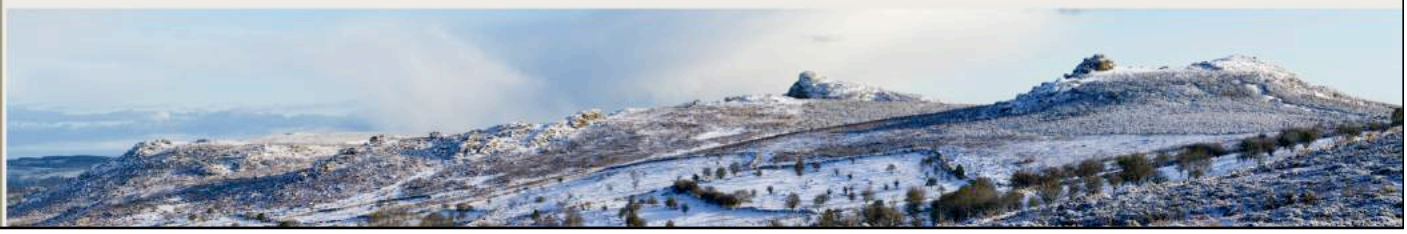
Conformation score	Fat class					
	2	3	4L	4H		Overall
U-	76.5	73.8	71.7	70.4		73.1
R	74.8	72.1	70.0	68.7		71.4
O+	73.1	70.4	68.3	67.0		69.7
O-	71.7	69.0	66.9	65.6		68.3
P	70.8	68.1	66.1	64.7		67.4
Overall	74.1	71.4	69.4	68.0		70.7

The whole SW England region, not just Dartmoor, is a meat exporter, producing very high volumes of generally undifferentiated product. Specifications from the slaughterhouses and butchers and wholesalers are generally uniform and, in the case of beef, are difficult to achieve on a Dartmoor hill farm without feeding at least some concentrates.

Farmers are 'price-takers', whether at the abattoir or at the fatstock or store mart – the price is very much set by the bulk-buying purchaser. Farmer attempts to overcome this by working together have thus far not succeeded and there is no sign that this will change (at least at 'big picture' level).

The (lack of) economic driving forces: public goods and farming

- A range of ecosystem services at least partly provided by appropriate farming remain public goods including:
- Clean reliable drinking water; flood prevention; carbon storage; cultural landscape



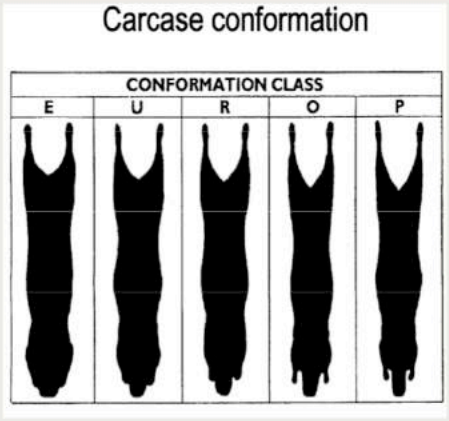
The farmed landscape of Dartmoor's moorland provides array of public goods & benefits, including: 6% of England's archaeology, 92 million tonnes = stored carbon, drinking water to 1million people in 2007 and public access over 47,000 ha. Tourism is hard to measure, but is undoubtedly substantial. None of these are directly (and largely not even indirectly) rewarded in agri-environment or other forms of public financial support. There has been much talk in policy circles of Payment for Ecosystem Services (not least perhaps as a way of reducing the expectation that Government is the only possible source of support for the otherwise unviable providers of those services), but there are few if any examples of successful implementation of PES schemes.

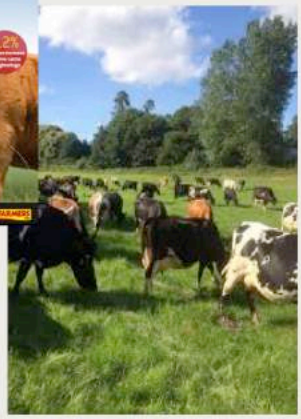
Brexit will expose the level and nature of engagement with, understanding of, interest in and value given to hill farming on Dartmoor, whether from a more traditional farming/food perspective or the more recent public goods/ ecosystems services point of view. Everyone seems to have accepted that support for farming will drop markedly; still unresolved are whether that means a drop for 'high priority' areas (of which Dartmoor's moorlands will surely be one) and whether the form any support would have would be appropriate and workable – potentially, a lot of eggs would be put in just one basket, and a basket with a rather uneven delivery record at best.

TB illustrates many of the fears of the friends of HNV farming. Farmers say that the problem is not so much the disease, but the measures put in place to try to control it, which are often unworkable and unrealistic while at the same time making little or no biosecurity sense. Regulatory impact assessments (for example, in the context of environmental and other wider policies) seem not to feature in decision making, while 'simplification' takes on a totemic role, undercutting local solutions which work for both farming systems and disease control, prompting suspicions that decisions are actually motivated by the desire to cut spending, and adding to the feeling that Government doesn't understand nor want to understand.

If Government does know what it wants, it is often poor at communicating it and at providing the means to delivery it. The Favourable Status of sites designated for nature conservation is a case in point. It has failed to build on the excellent Dartmoor Farming Futures initiative, which both engaged with farmers to describe and agree desired outcomes and provided a flexible framework within which that could happen.

The farming narrative as a driving force





- Received wisdom of what 'good farming' is continues to glorify the intensive lowland farm, its products, its inputs, its machinery
- This continues to be the message given by the agricultural press, agricultural education and training; agricultural shows; Young Farmers' Clubs etc.

A certain type of farming is essential to provide public benefits in DNP. It imposes constraints on farmers' aspirations or at least on how economically-realistic it is to achieve them. Those aspirations are sometimes driven by the market – the specifications demanded by slaughterhouses, for example. But many are driven by the mentality of farmers, the social pressures of their peers and the process by which they came to that way of thinking, including the farming press, agricultural education, agricultural shows, Young Farmers' Clubs' activities, and so on. Given the lack of sharing opportunities provided in other places by things like farm discussion groups and monitor farms, the danger is that the discussions held with the accountant about the realities of farm economics and the choices facing the farm are hard to fit into the 'default mode' of farming thinking. This is a real challenge for hill farming on Dartmoor.

It is very difficult to get a clear picture from farmers, since their mental approach (optimism, determination, for example) is hard to disentangle from their actual situation and from the range of possible options which are realistically open to them. One farmer admitted that what he and members of his family felt and aspire to varies considerably, and all find it difficult to grapple with what their accountant tells them is the actual situation. Someone said that it's very difficult to know what to think when one farmer says that his hill cow is making him a massive loss, while his neighbour says that she is an extremely valuable asset which he can't afford to lose.

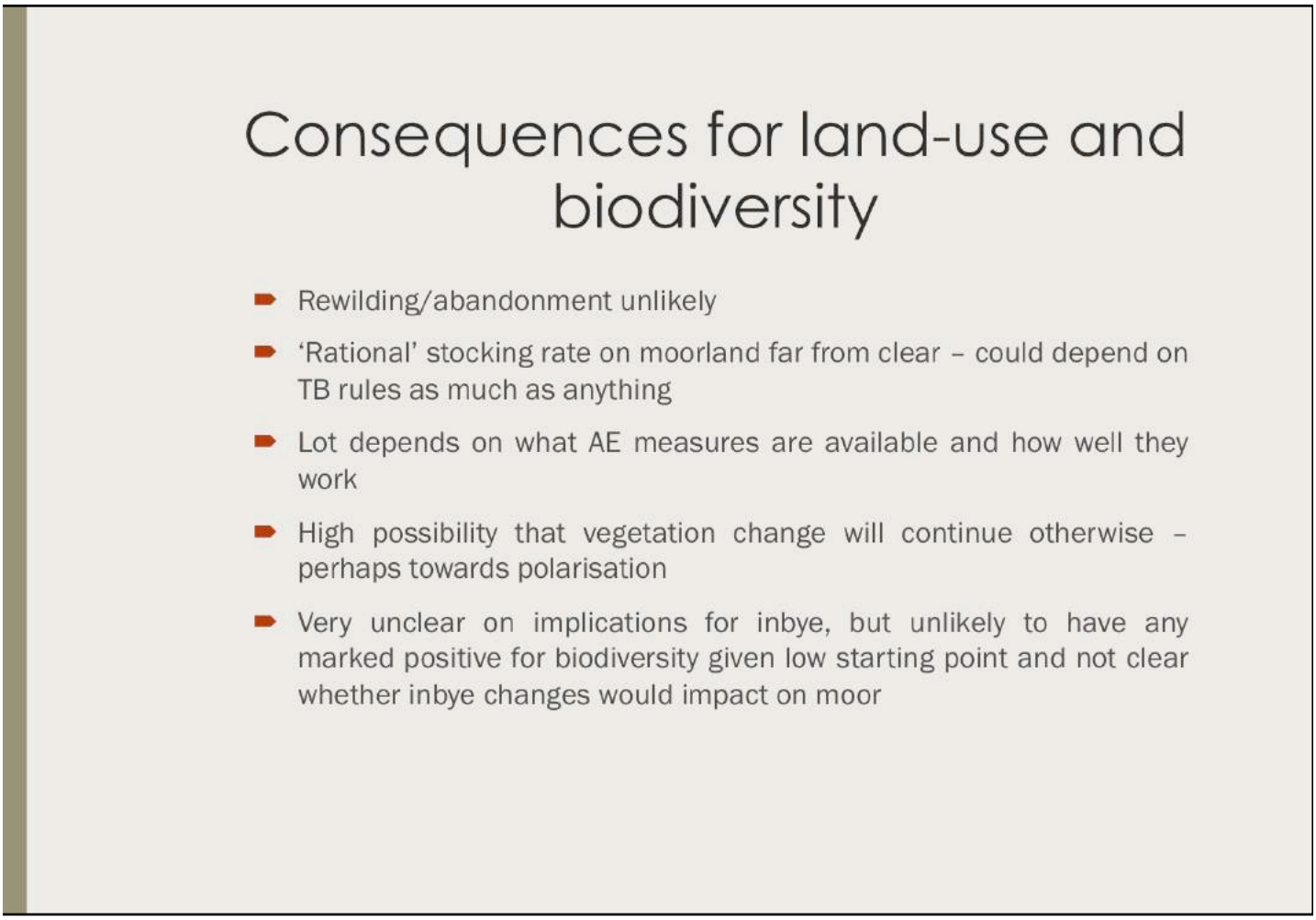
Farmers admitted to us that they value things like:
- Adapting to survive, as all their antecedents had done
- Maintaining or increasing stock numbers (to reduce them is a sign of decline, pure and simple)
- Farming all the land 'properly' (which can be a safeguard against abandonment, but also make deintensification difficult)
- The price they obtain from slaughterhouses/at the mart

Farmers are clearly not 'economic men' in many of their decision-making. They are certainly adaptable and many of them are very determined; this determination may yet pass to yet another generation. Yet it is difficult to ignore the evidence of history and of other areas and to conclude that Dartmoor hill farming won't be severely threatened by the potential impact of Brexit.

Farmers told us that a loss of support and/or increased competition would force them to look to their technical laurels and become more efficient, cutting any superfluous spending. We asked them why, if they could imagine such a viable system, they didn't implement it now, alongside the support payments; they were unable to explain this to us. But the answer perhaps lies in the non-financial things they value – they could potentially give up on some of these, 'cashing them in' for extra finance. We find it difficult to believe that the tens of thousands of pounds of savings it would need in some cases to make up for the loss of direct payments could be so easily

Another big unknown is what would happen to costs. At present, land prices are seemingly irrationally high – would they drop in the worst Brexit scenario? On Dartmoor, rents are a big issue – rents are increased everytime a tenant goes into agri-environment, for example; will they be decreased if direct payments are lost?

And finally, farmers are not at all clear what would happen to regulation. Some, probably more in hope than expectation, say that without payments there is no justification for high standards, especially if there is freer trade with the rest of the world. But while some regulation is undoubtedly linked to the post-CAP settlement, others, such as for TB, are very much home-grown, addressing a real issue but imposing very high – possibly unecessarily high – costs on Dartmoor hill farming.



The starting point for the moor is the 'free' summer growth. We suspect that there will always be systems which take advantage of this, but without taking on any additional costs if possible. The one big caveat is the TB testing/movement regime – this has the potential to be a major disruptive influence if not handled appropriately.

This implies that rewilding and large-scale abandonment is unlikely; where abandonment has taken place, it tends to be where smaller farms have been sold out of farming families. But it may still imply a continuation of present negative trends in Molinia, Ulex and Pteridium and, if agri-environment is lost, possibly an increased pressure in some areas, possibly creating an even more polarised land use, probably to the detriment of biodiversity.

If agri-environment is retained, it seems likely that all of the policy eggs will be in that basket, so the pressure on it to succeed is high and its vulnerability to its current weaknesses is also enhanced.

While we are not sure that farmers would agree with us, it seems to us that the inbye would probably see more change, since that's where the cuttable costs are higher. It is quite possible that the inbye systems will become less intensive, though not necessarily more linked to the moor than at present (some are, some aren't…). But the likely positive impact on biodiversity should not be overstated, given the inertia in highly-fertilised permanent pastures on heavy soils.

One thing which might be forced to emerge is more part-time farming, which could bring with it a new set of aspirations and evaluation criteria. This could be a double-edged sword for low-output systems, however low-cost they may be.

The HNV vision

Economically and socially viable HNV systems

Farmed biodiversity-rich landscapes: the Dartmoor Vision for 2030

- The agreed vision for 2030 already exists and was meant to guide delivery, especially AE agreements and resolve potential conflicts over what was to be delivered on each area.
- Includes:
  - Selected Habitats & geology
  - Water
  - Carbon
  - Archaeology
  - Landscape and access
- It describes a farmed landscape, delivered through active, viable farming systems producing food.
- Endorsed by all the relevant Government agemncies and Dartmoor Commoners' Council representing the farmers.

The Dartmoor Moorland Vision was produced in 2005 following consultation with all the relevant statutory agencies following concerns amongst the farmers that there was a lack of a long term vision and the potential for conflicting demands on areas of moorland. An independent facilitator secured agreement between the agencies on the principle outcome for all the moorland (usually nature conservation and/or archaeology). Described further in the innovation fiches, it includes broad objectives for all of the moorland habitats; though not informing policy as clearly and directly as it might be, the Vision and its elements remain valid today and are taken by this project as the HNV Vision for the Dartmoor LA.

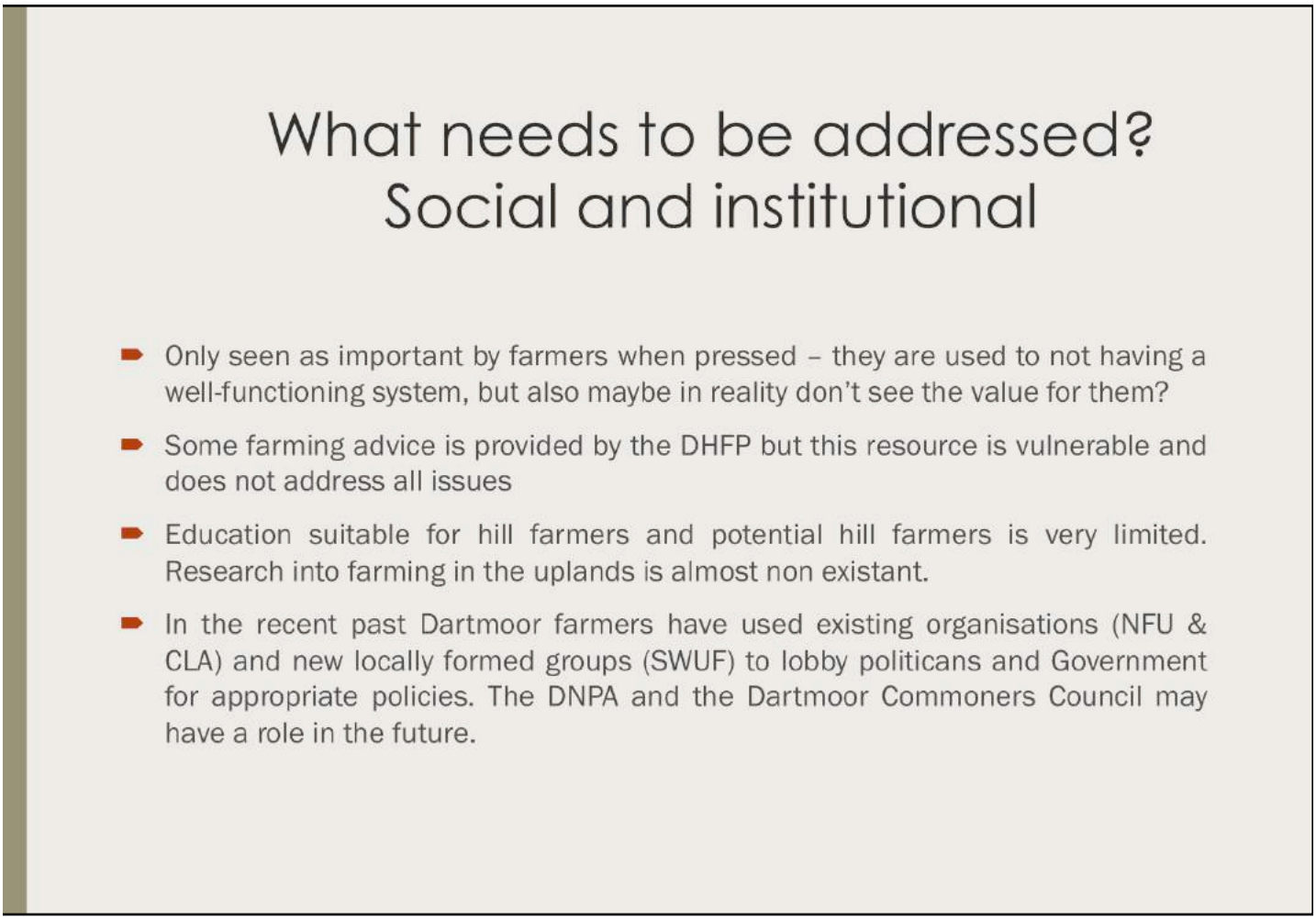
In the 18th-early 20th century, innovation on Dartmoor was very much focussed on techniques and technologies – the introduction and development of new breeds and of systems to make best use of them, for example. However, in recent years, at least for the moor-based systems, the innovation, for better or worse, has all been on things like regulations, schemes, institutions, with a modest amount of activity on products and markets.

It was therefore very surprising to us that our focus group of farmers stressed first and foremost the need to innovate technically in the years ahead, seeing this as the only way to improve efficiency and (with the exception of the one-off investment grants they thought should return) to be free of the tyrrany of schemes and their restrictions.

It has not so far been possible to make an organised list of innovations desired under this heading (perhaps it was in part a wish to see such appropriate innovations emerging that was being expressed, rather than an awareness that they exist and need to be transferred), but examples given included flock genetics testing and virtual fencing using phone apps and livestock collars.

When it came to what needs to be changed, the farmers' message was very clear – the way current scheme rules and other regulations impact on their management decisions and farm economies. However, it was not so clear that they thought of this as a possible focus for innovation, despite the progress made in quite a few policy areas on Dartmoor. This possibly reflects a failure to mainstream some innovations (Dartmoor's Farming Futures), or a perceived tendency to roll back on others (TB plans?). Others were valued and recognised as being good (fire plans and associated activity), but were perhaps not seen as addressing the fundamental issues.

Our perspective is that there is much scope for major and positive improvements, not least by rolling out properly the excellent pilots and experimental approaches which have been trialled on Darmoor. Given that farmers often do not disagree with the objectives of schemes and that agri-environment income is not only important at present, but likely to become even more so in the near future, it seems to us that this has to be one of the major focusses of the project.



In our discussions, it seemed that farmers are clearly not used to thinking in terms of institutions, but are very individualistic. For example, the picture as regards collective learning was very confused. The Dartmoor Hill Farm Project was set up partly to fulfil this perceived need, but many training courses fail to attract attendees – are these the wrong format, or addressing the wrong questions? The Moor Skills apprenticeship programme was much praised, and seen as delivering benefits for the farmer hosts who had to start discussing their farms with each other, yet the idea of a farm discussion group or series of monitor farms where farm accounts and management decisions are discussed was treated with suspicion – perhaps something need would benefit from visiting elsewhere? The experience of the study tour to Lenk in Switzerland many years ago clearly continues to inspire farmers, but noone seems able to take this forward, if only to organise further exchanges.

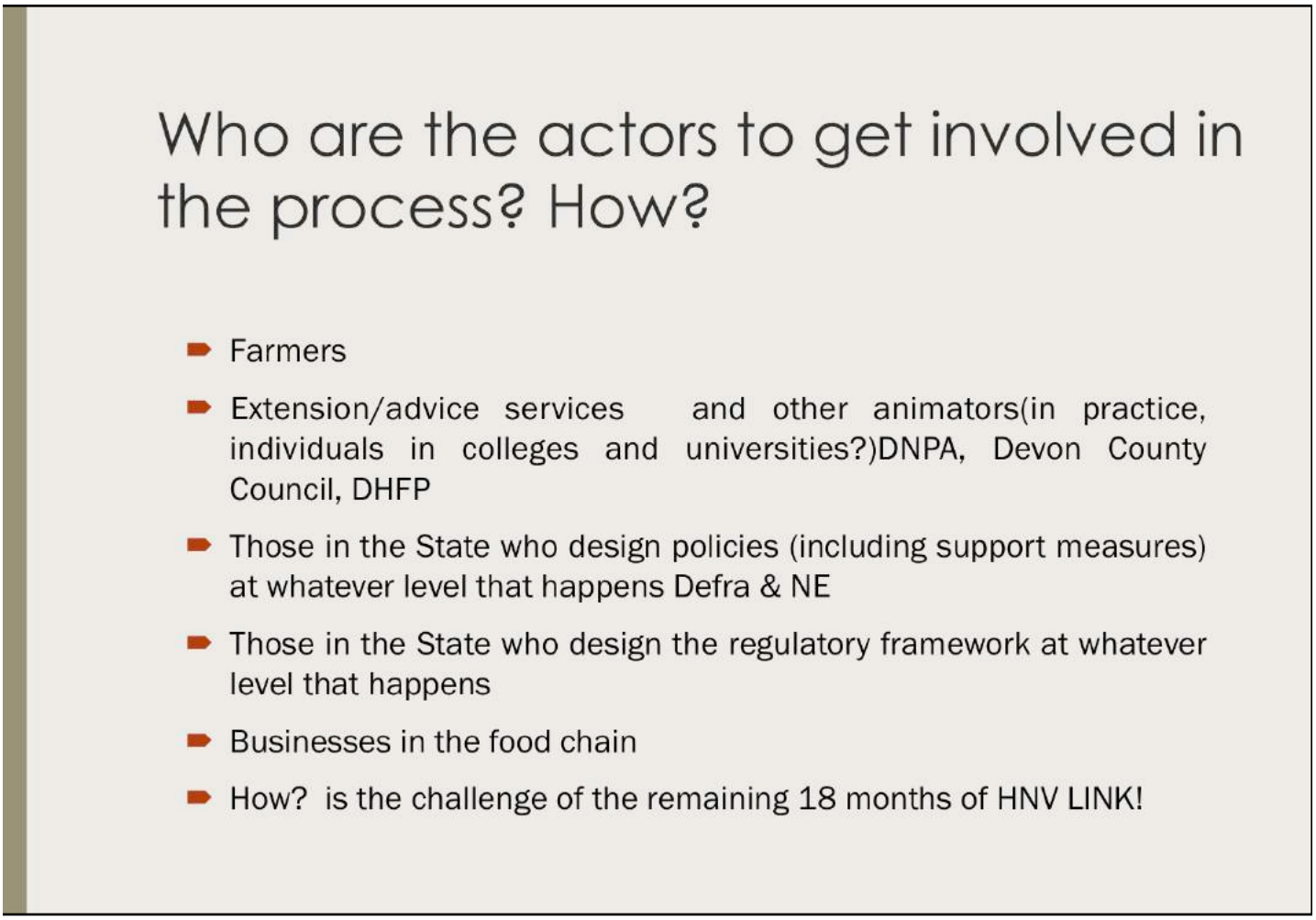
Dartmoor Commoners' Council was an extremely innovative development, albeit one which settled into a modus operandi which was much more limited in scope than its founding Act allowed for. On occasion, farmers seemed to have aspirations for that to be the focus of more social and institutional innovation, developing innovation in other areas as well, but they seem unable to grapple with how to take it from what it is now, with the capacity in terms of staff and governance that it has now, and change it into something more.

Dartmoor National Park has been a real driver of positive innovation, sometimes backed by funding from various funding streams associated with the Duke of Cornwall, but it is regarded with suspicion, even open resentment, by many farmers. As well as complementing the DCC on aspects of management and use of the moor which don't come under that body's responsibilities, it covers the areas of the park, including the hill farms themselves, where DCC's writ does not run. There is clearly an opportunity to do more and better, and in a way which better engages the farmers.

The State is another potential source of innovation, but seems to be becoming ever more centralised, with apparently-efficient standardised approaches. However, the search for value for money could bring a renewed appreciation of approaches which are tailored to local circumstances, local costs and impediments and which not only work towards locally-appropriate results but actually tries to deliver them. If so, improving the way farmers and others interact with

Before meeting with the farmers to discuss this Baseline Assessment, we thought that while we would focus on regulations, schemes and institutions, their first thought would be on obtaining a better price for their product through marketing initiatives of various types. Nothing could have been further from the truth; while there would be agreement on the need for a better price in general, we were surprised with the lack of focus on local (individual, group marketing etc.) initiatives. It became clear that this was not for the want of trying them, but reflected a feeling that the effort was not rewarded – it was just too difficult and did not repay with extra work.

What is clear however is that a large amount of money is being spent in and around Dartmoor every year, capitalising on the activities of farming in the countryside, and that very little of this returns not just to farms, but especially to the farming system itself. Various non-farming 'stakeholders' beat the drum of 'payment for public goods', but there is next to no action in making this happen in the wider economy. There will be better examples of working together from which Dartmoor can draw inspiration.



The social cohesion provided by the Dartmoor Commoners' Council, the Dartmoor Hill Farm Project and to some extent the Dartmoor National Park Authority should enable and encourage innovation to continue to evolve and develop but farmers face an uncertain future following the decission to leave the EU. Whilst farmers are focused on the future they may try to make their businesses more resilient but this may stifle innovation apart from that linked to improving productivity. This may not be good for HNV farmland and the environment generally.

The HNV-LINK inniciative could eviolve to provide a steer and/or platform to encourage innovation. This will need to be considered and developed to complement the existing support.

Selected reference list

- This presentation is based on a large number of books, reports, articles and web pages, few if any of which are peer-reviewed. The list below represents only a selection of the material consulted in printed or pdf format.

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