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

LEARNING AREA « DALSLAND » (Sweden)

A BASELINE ASSESSMENT

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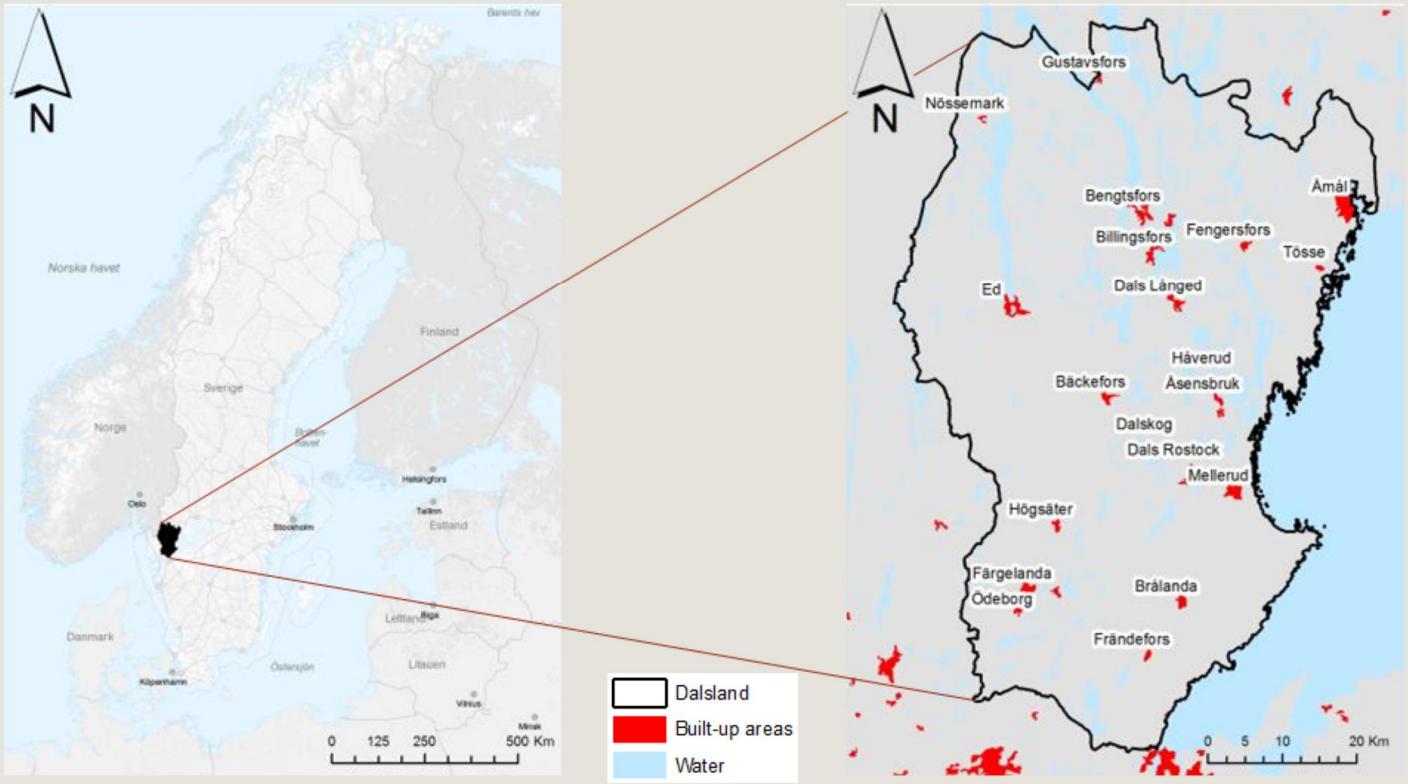
Locating LA Dalsland



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.

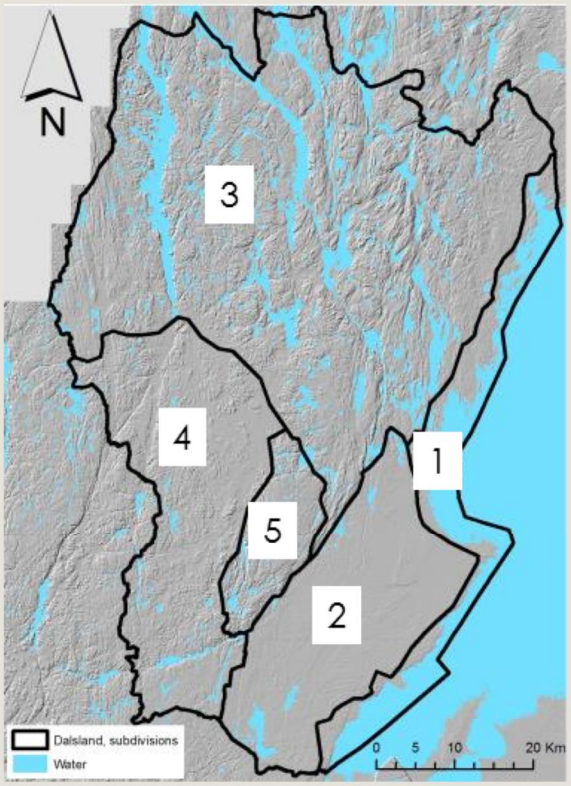
Dalsland was formed by glaciers. Large parts of Dalsland were below sea level at the end of the last Ice Age. The whole area was for many years an archipelago.

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.

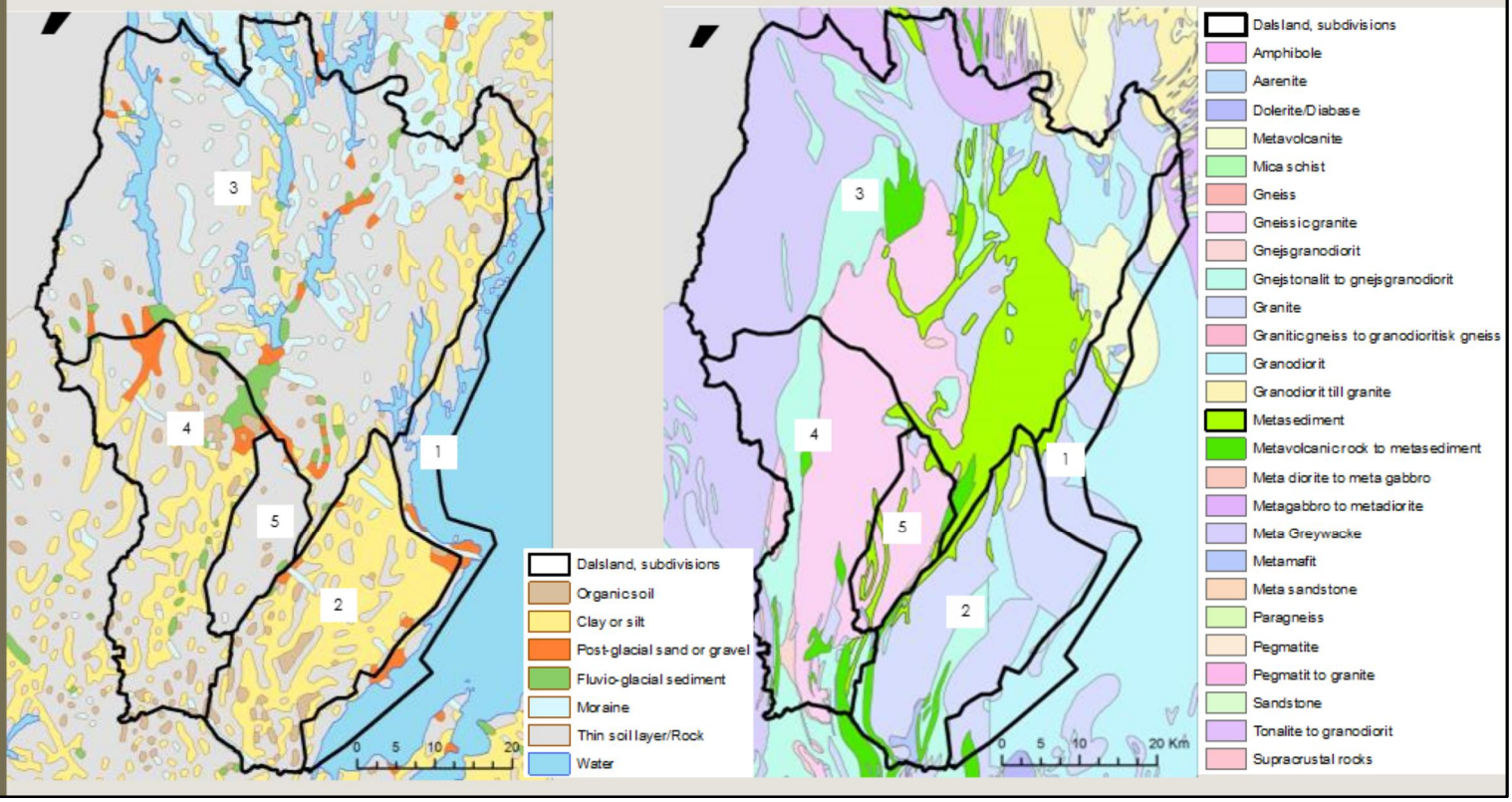
3: Forest and Lake area
The northern part of Dalsland is rich of lakes, hills and widespread forests.

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 specific part of Dalsland has historically been important as a commons and outfield for the farmers in the

surrounding areas.

Soils and Geology

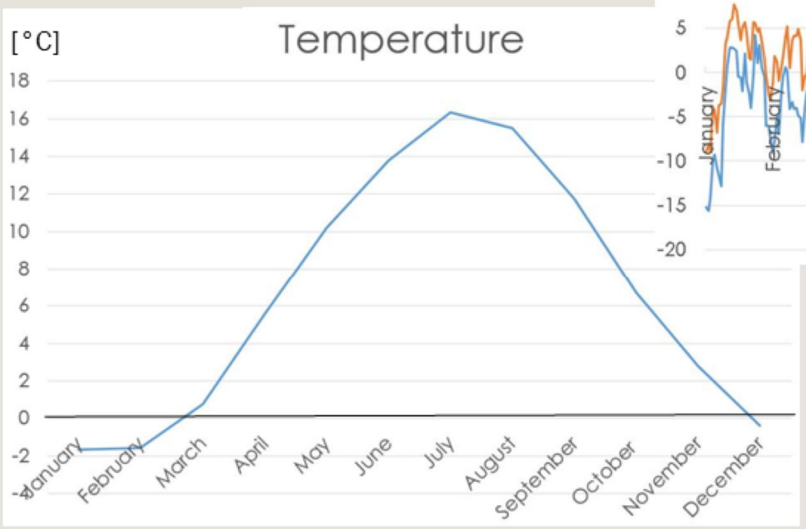


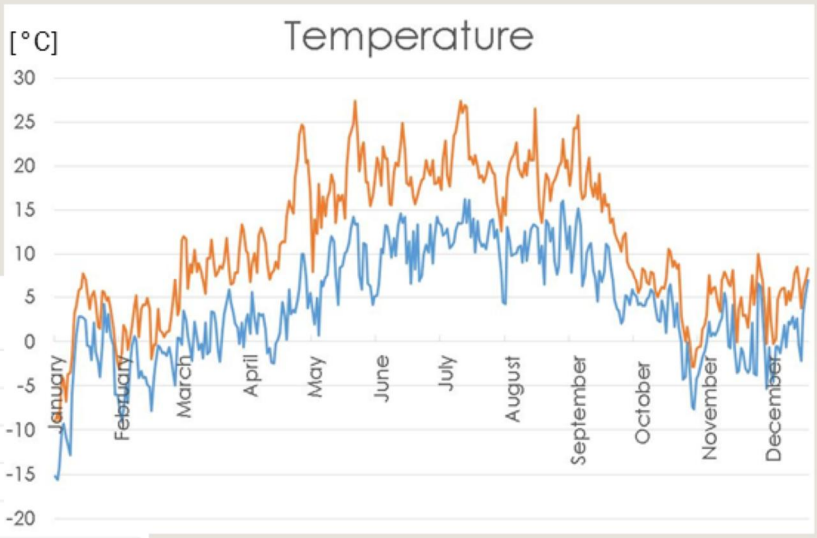
The distribution of different soils reflects the local conditions by the end of the Ice age. Areas above sea level, for instance the Kroppefjäll plateau area, have thin layers of soil or even an outcrop of bare rock. Areas below highest coastline have been affected by many processes when the ice withdrawn 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.

Weather and climate, Dalsland

- Average monthly temperature, 1996 to 2016 (Kroppefjäll plateau area).





- Highest and lowest temperature each day in 2016

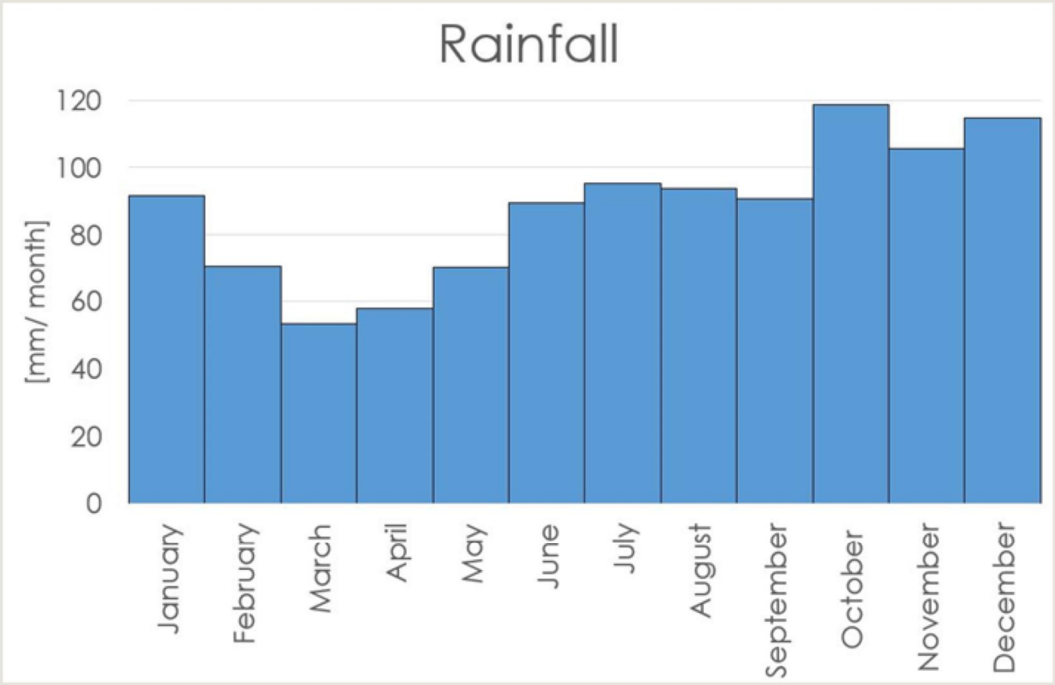
The left diagram illustrates the daily average temperature expressed as a monthly mean from 1996 to 2016 at the weather station Granan at the Kroppefjäll plateau area. July has the highest average temperature (app. 16 °C) and the lowest average temperature is in January and February (app. -2 °C).

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).

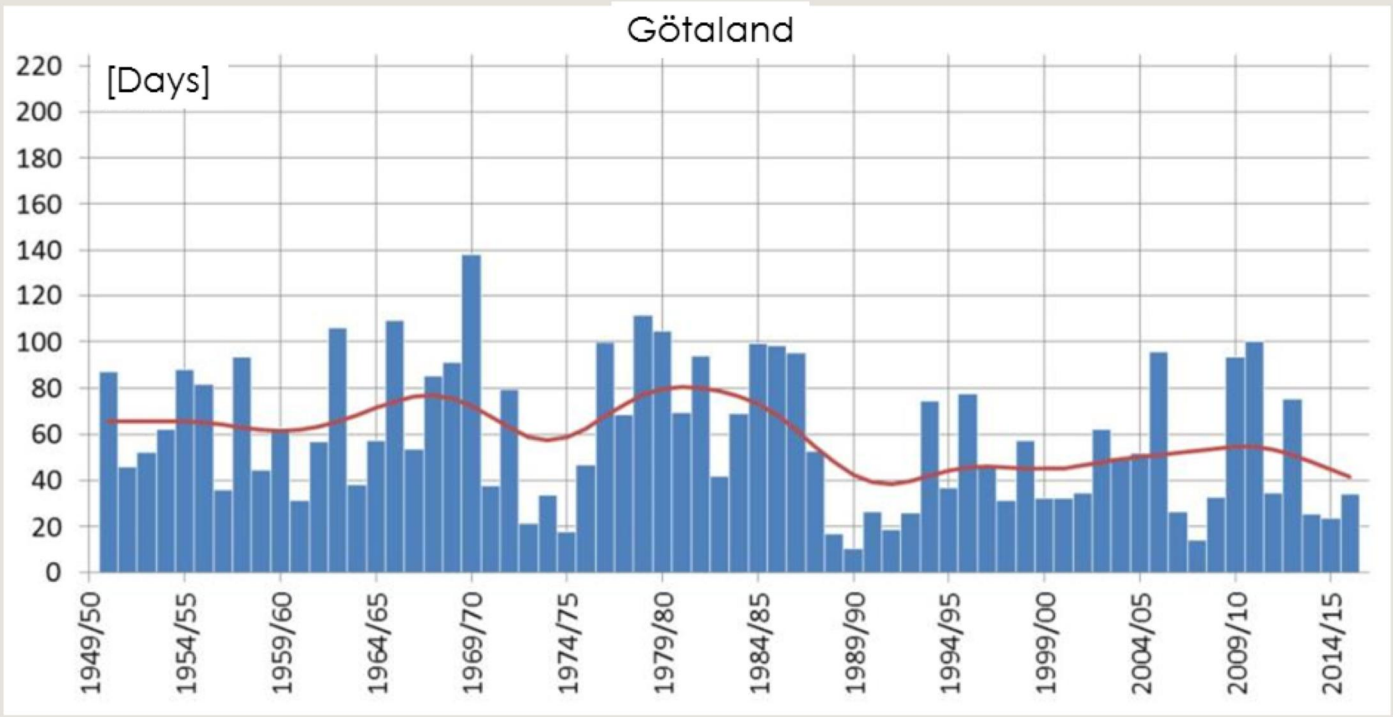
Climate, Dalsland



- 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



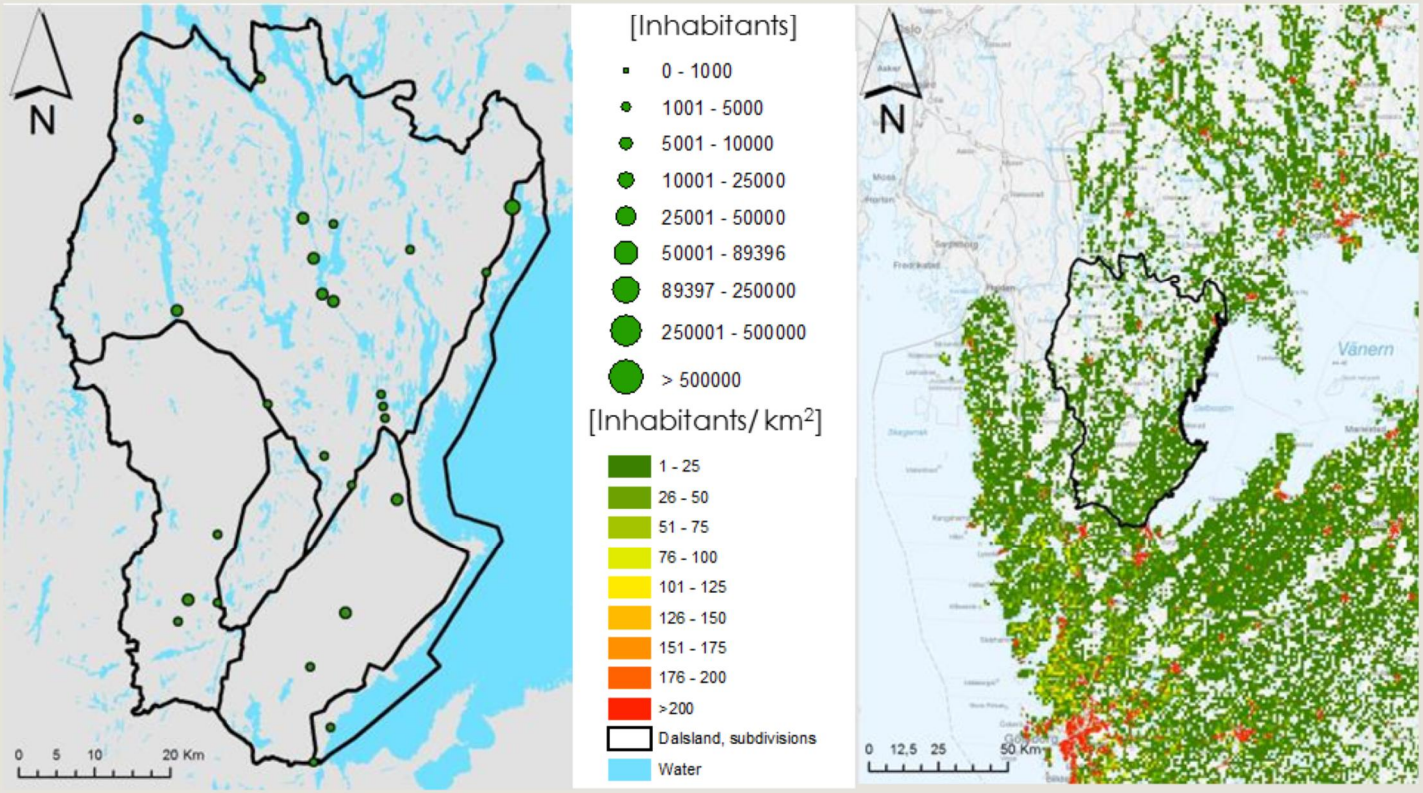
Number of days with snow cover (Götaland, Southern Sweden).

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.

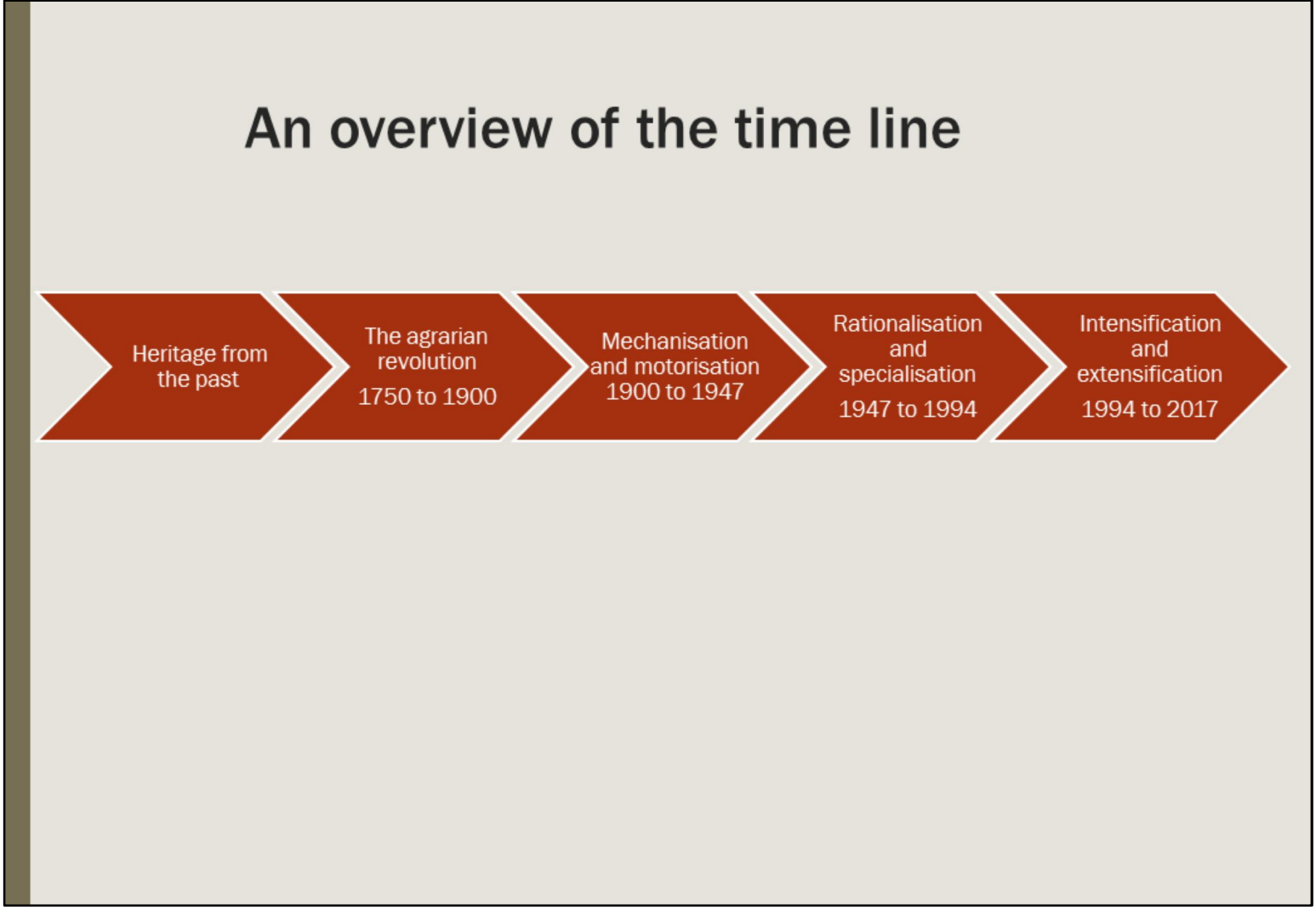
The rather wet climate, the big fluctuation in temperature over the year and between years, including periods of snow, creates constantly changing preconditions for plants and animals, as well as for farming. Historically the farming system in the area continuously adopted to these changes.

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

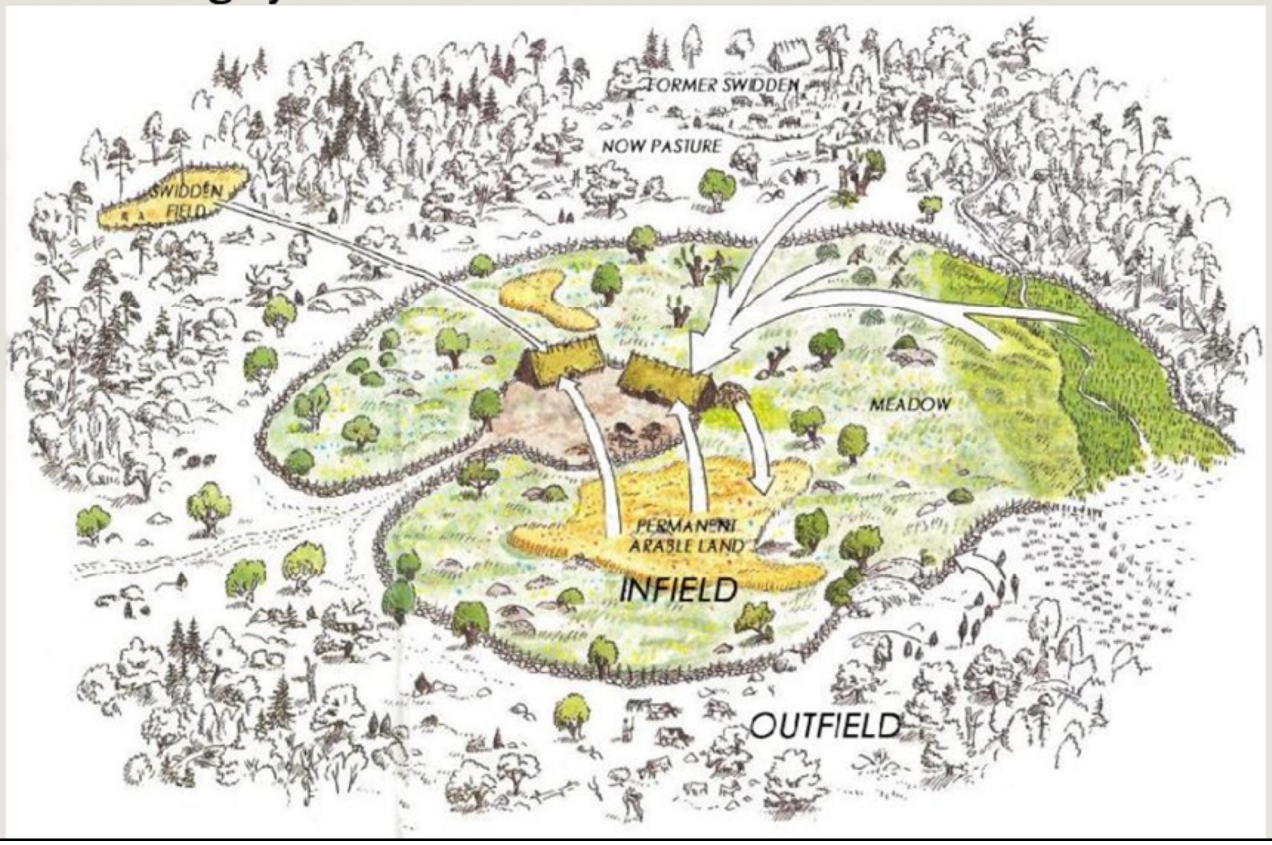


Illustration and text:
Ängar.
U. Ekstam,
M. Aronsson,
N. Forslund,
p. 34-35.

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.

Heritage from the past

Consequences of infield/outfield farming

- Nutrients circulated within the local farming system
- Aquatic features in the landscape were unmodified
- Fires was a recurring phenomenon
- Cattle grazing and trampling

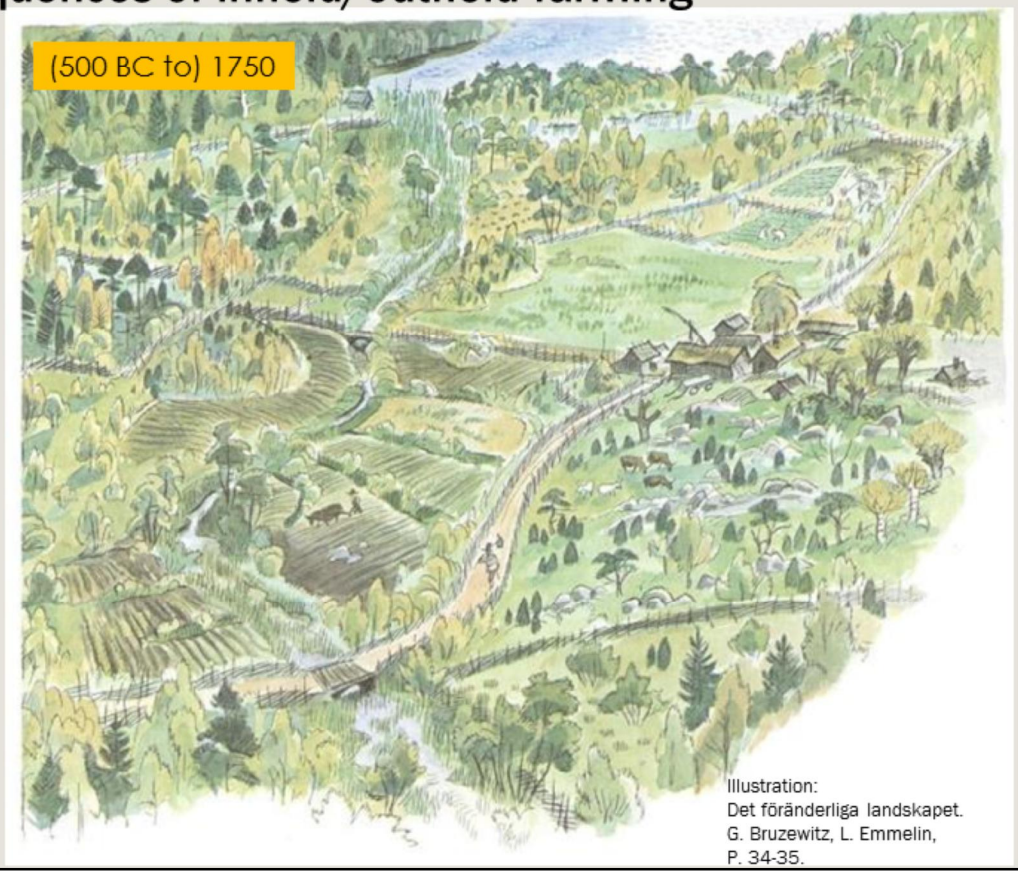


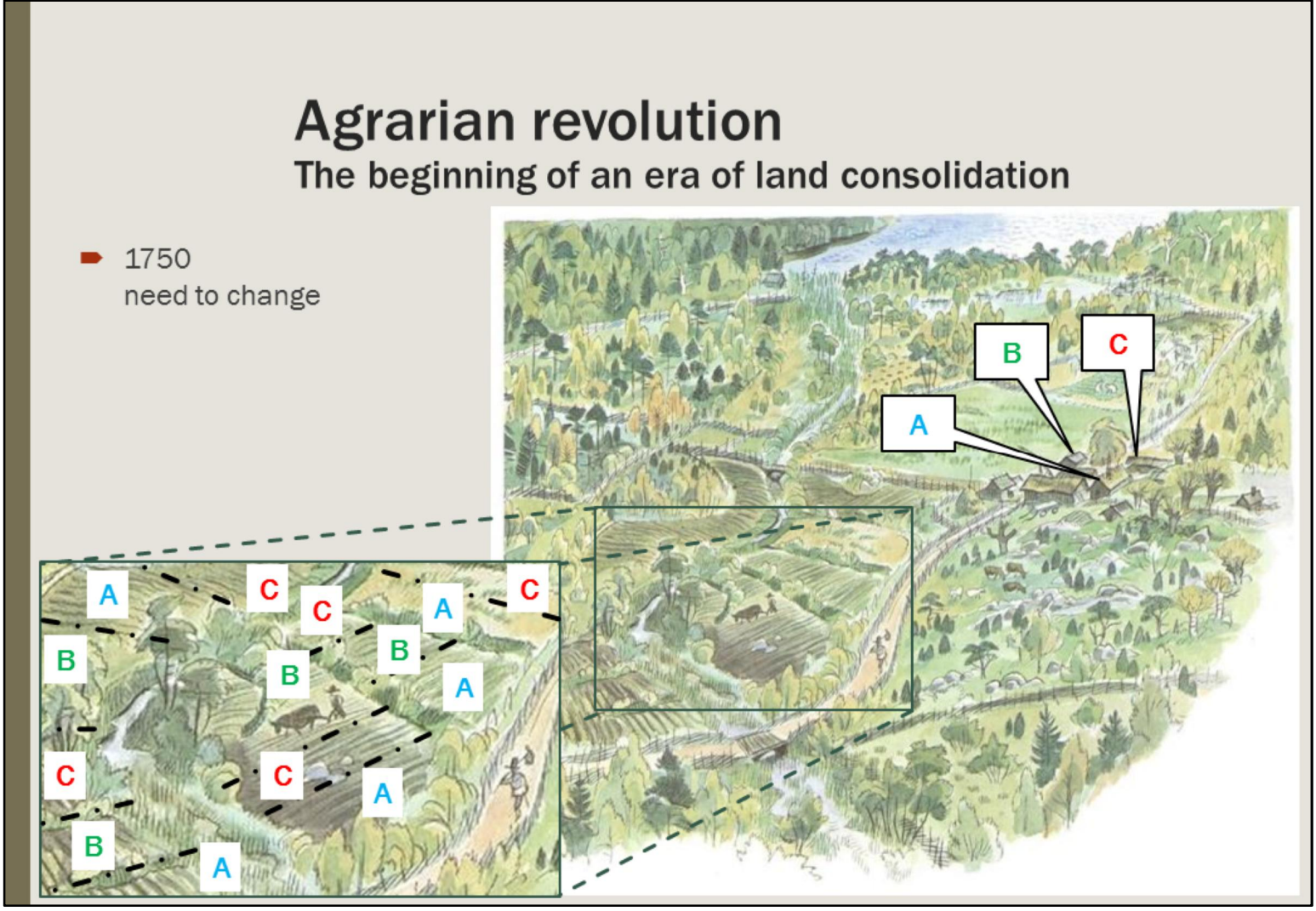
Illustration:
Det föränderliga landskapet.
G. Bruzewitz, L. Emmelin,
P. 34-35.

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.



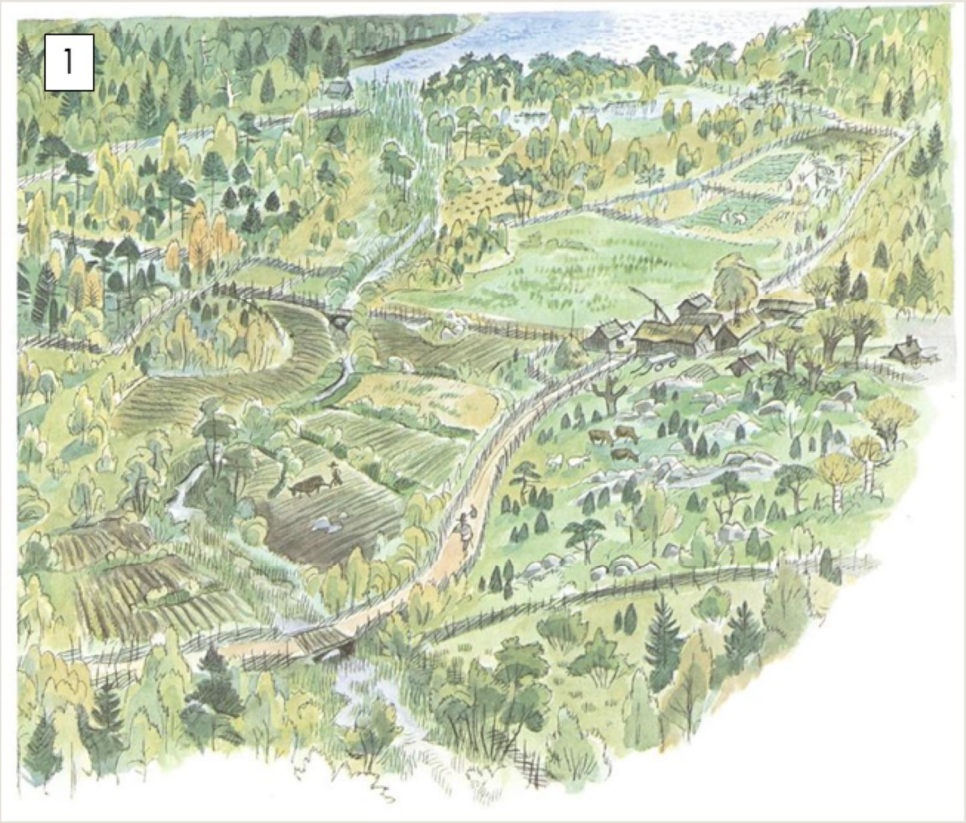
The infield/outfield-system had remained almost the same for about 2000 years. But over time, an ever more fragmented ownership pattern had developed in many areas of Dalsland. With each inheritance, the number of fields tended to increase, which in the mid-18th century finally led to a situation illustrated 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.

Agrarian revolution

1850 The decline of the outfield



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.

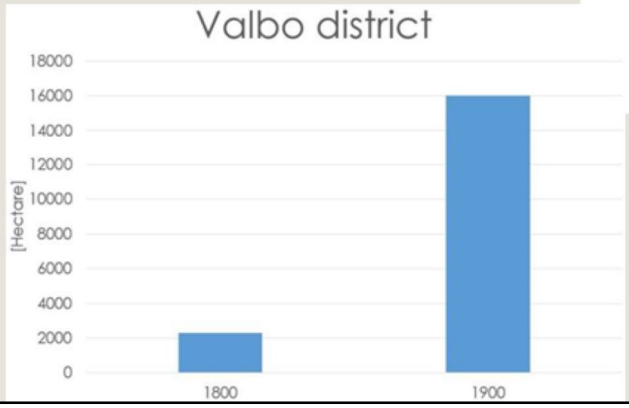
Agrarian revolution

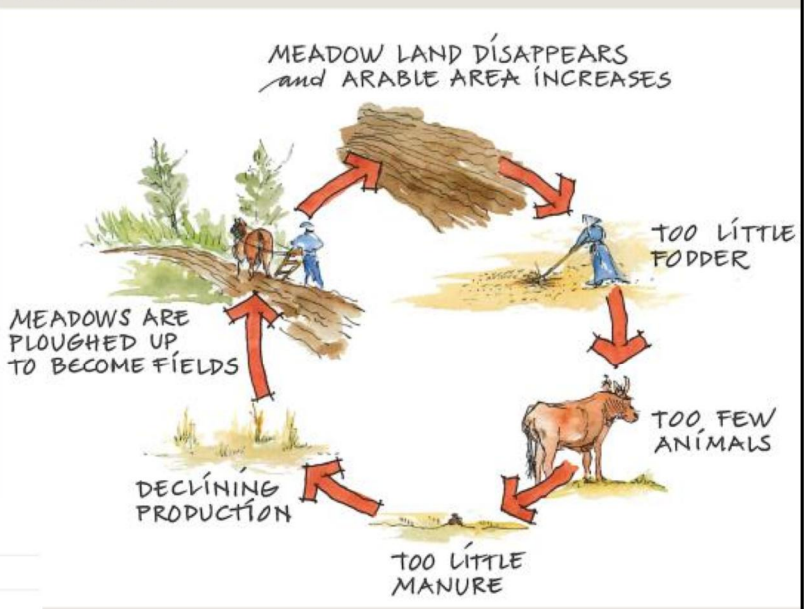
The vicious circle

- 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.



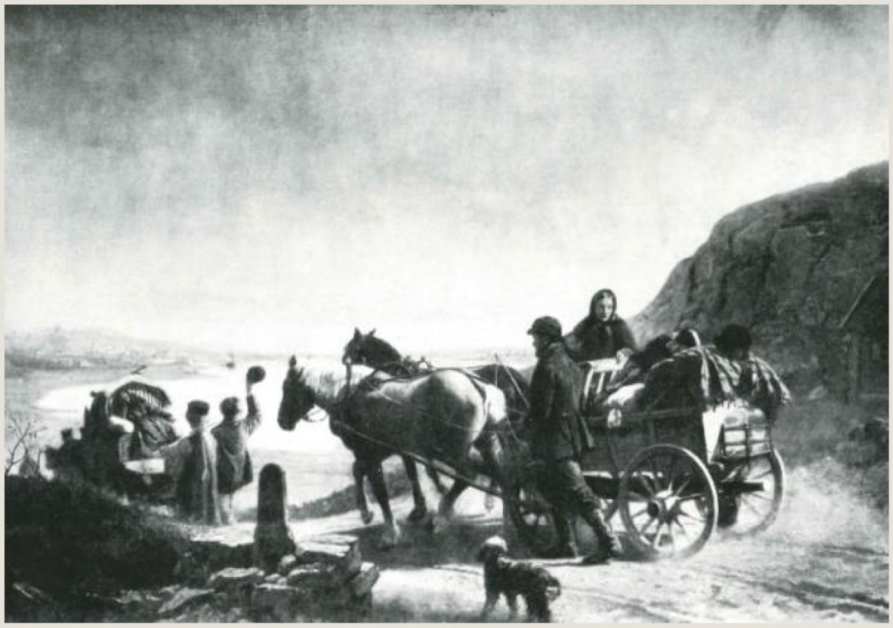


Picture above:
Emanuelsson, U. (2009)
The Rural Landscapes of Europe.
How man has shaped European nature.
P 294

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

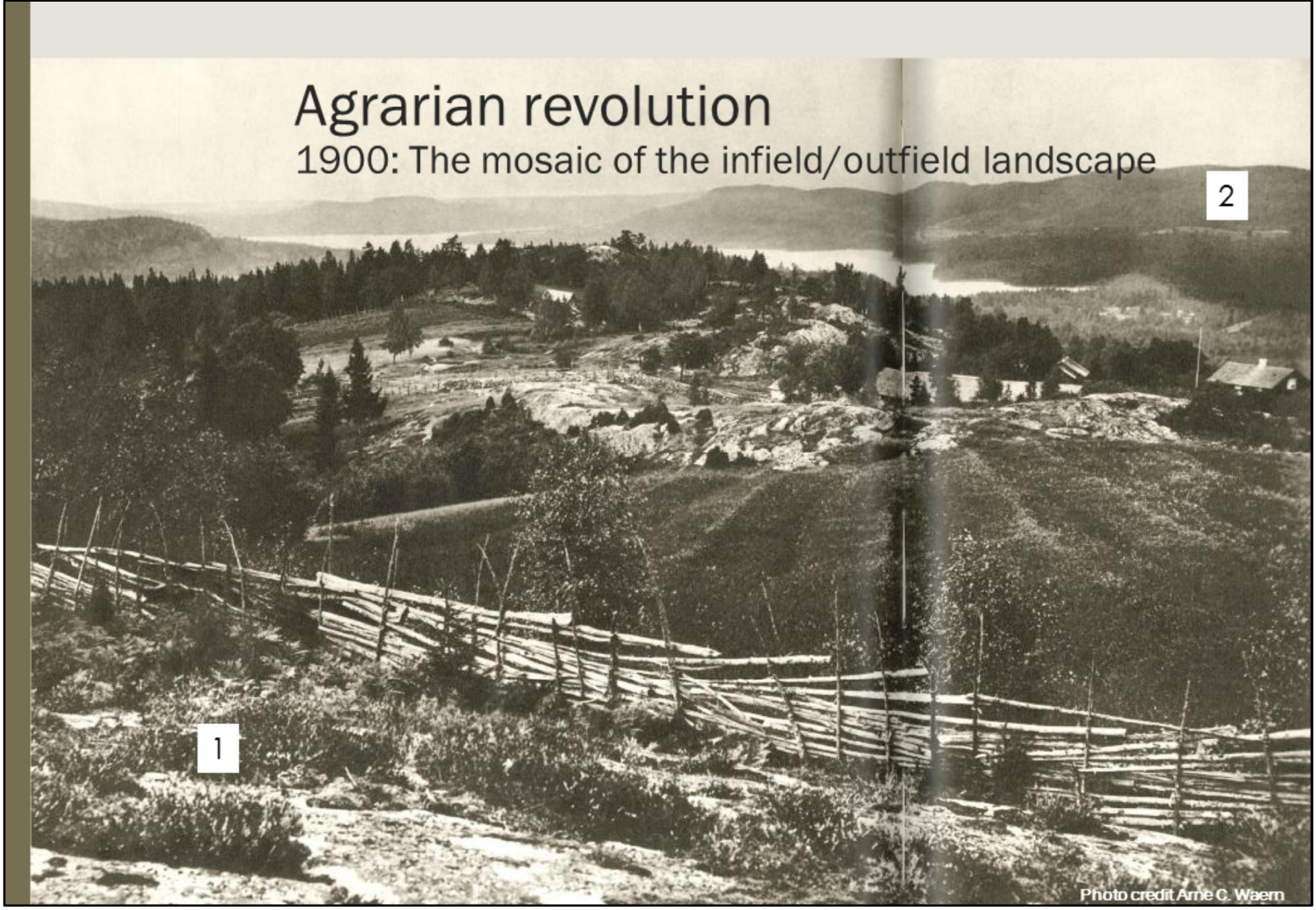


From painting of Geskel Saloman, 1872: Emigrants on their way to Gothenburg

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.

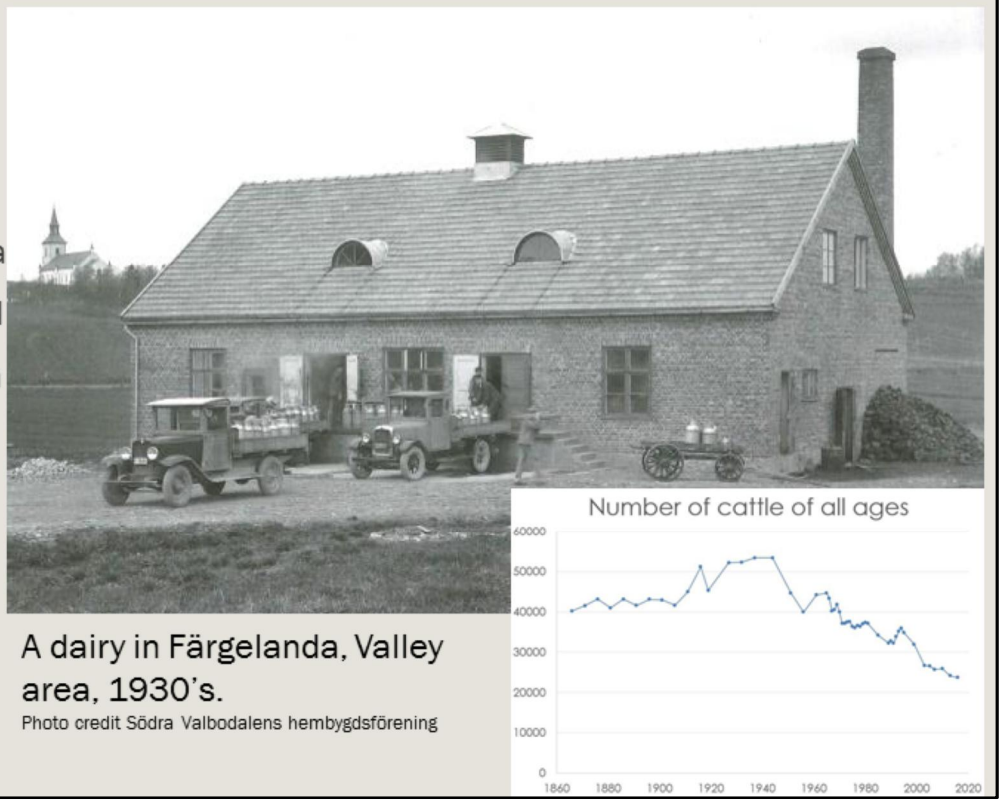
The establishment of the Swedish Forest Agency and the implementation of a more modern Forest Law meant a stronger public governance of the forest resources. The new law focused on regeneration and demanded that the ones clear cutting a forest area also were responsible for its regeneration.

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.

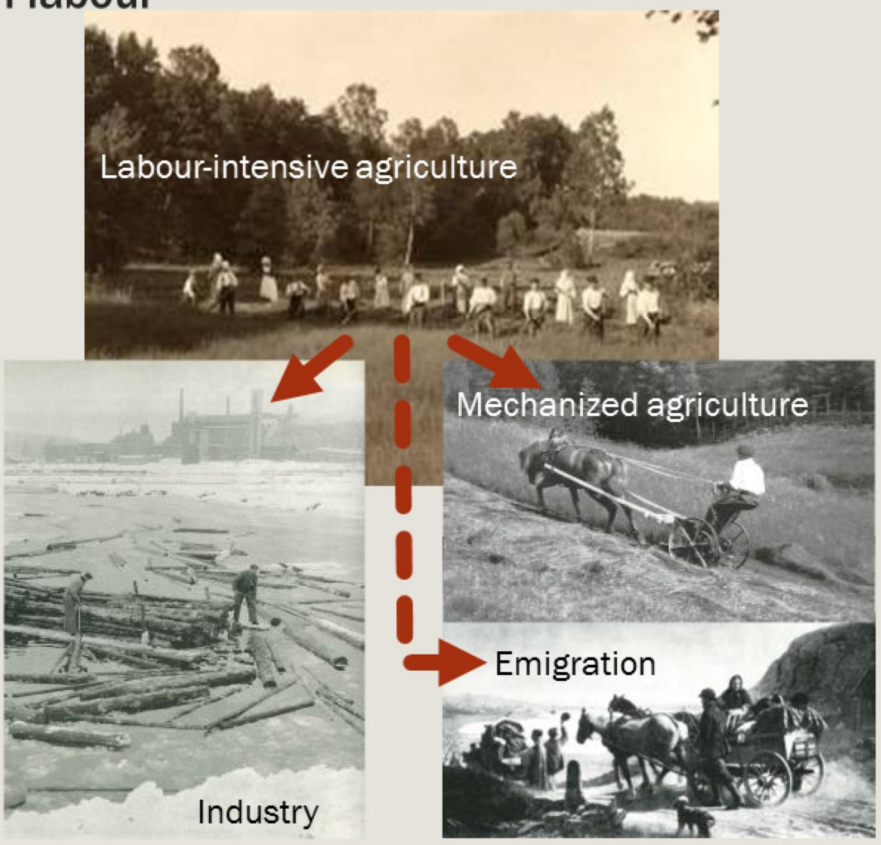
Improved manure management in the form of slurry pits, urine wells and roof constructions meant that more of the nutrients could be returned to the fields. This contributed to increased yields.

After World War II tractor sales took off seriously. This meant that the need for labour in agriculture decreased even further.

Mechanisation and motorisation

Radical shifts in labour

- 1900 to 1950 Rationalisation
- Fewer but bigger farms
- A decreased demand for agricultural labour
- Increased labour-needs in industry
- Urbanization
- Mixed farming almost universal



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.

Rationalisation and specialisation
Agricultural policy (1)

- Post-war period. The State wanted to:
  - a) Secure self-sufficiency of food
  - b) Increase efficiency in food production
  - c) Set labour free to support other sectors
- 1947 Agriculture Act:
  - 1: Revenue target
  - 2: Efficiency target
  - 3: Production target
- 1948's measures to reach these targets:
  - Increased price regulations and border protection
  - Establishment of regional chambers of agriculture

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)

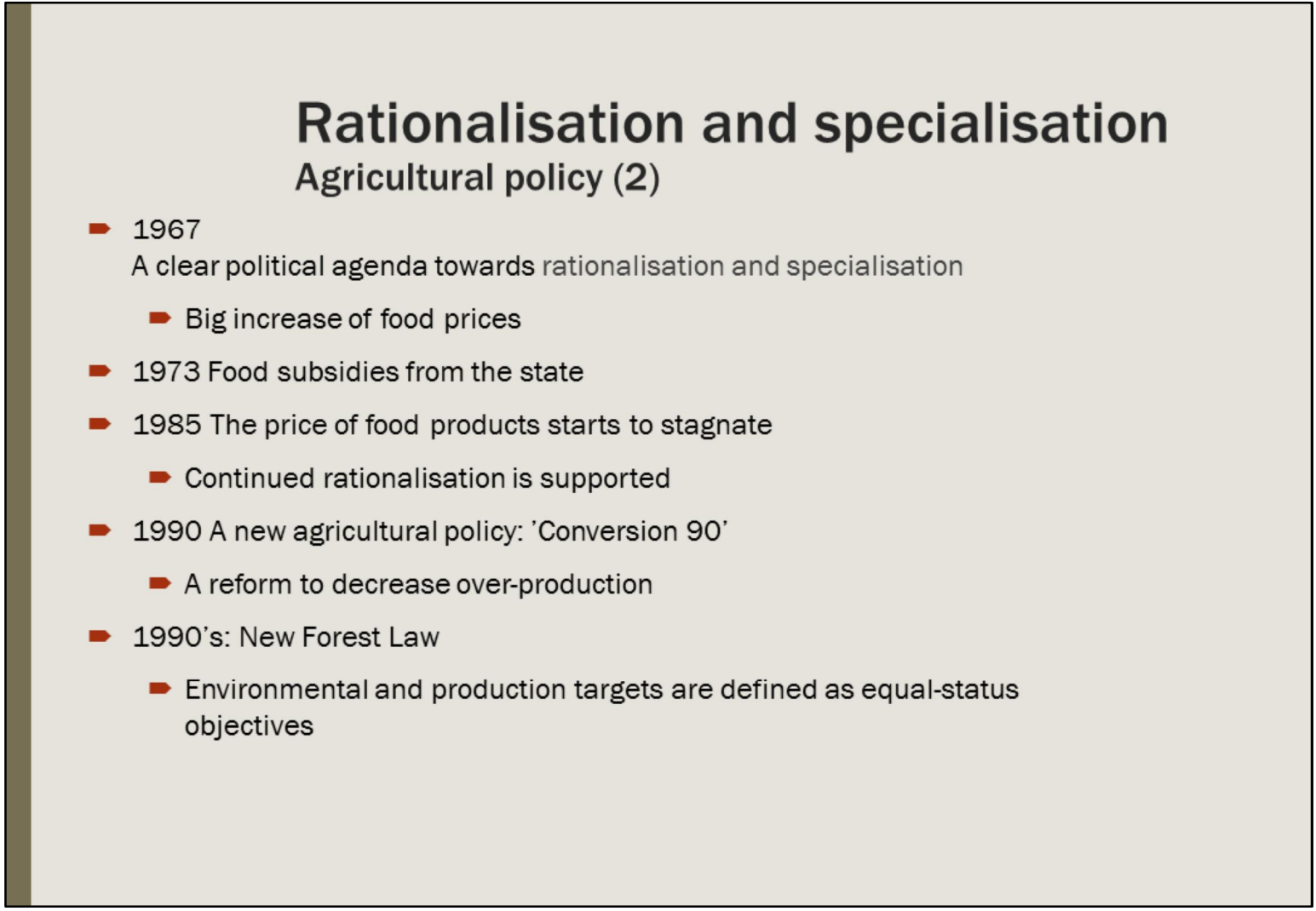
Photo credits: Lars Johansson

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.

Intensification and extensification

EU-membership

- 1994: Decision to join the EU
- EU Common Agricultural Policy
  - Re-regulation
- Free trade between the Member States
  - Border protection toward third countries
- Effect on farming community?
  - Pros and cons
  - Diverging opinions

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.

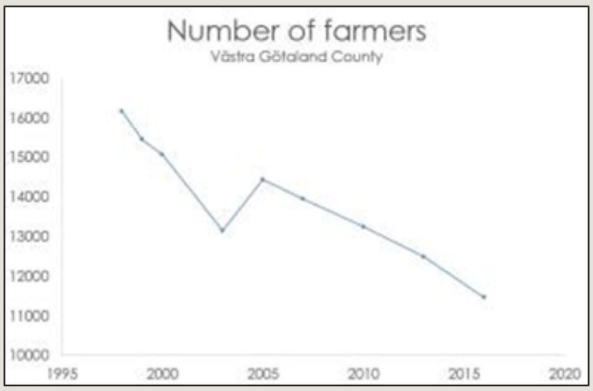
Farmers in general were divided, partly depending on their production direction, where in the country they were located, and farm size. On the other hand, the Swedish Farmers' Federation (LRF) was clear that it considered that the CAP could provide greater clarity, stability and long-term rules of play 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



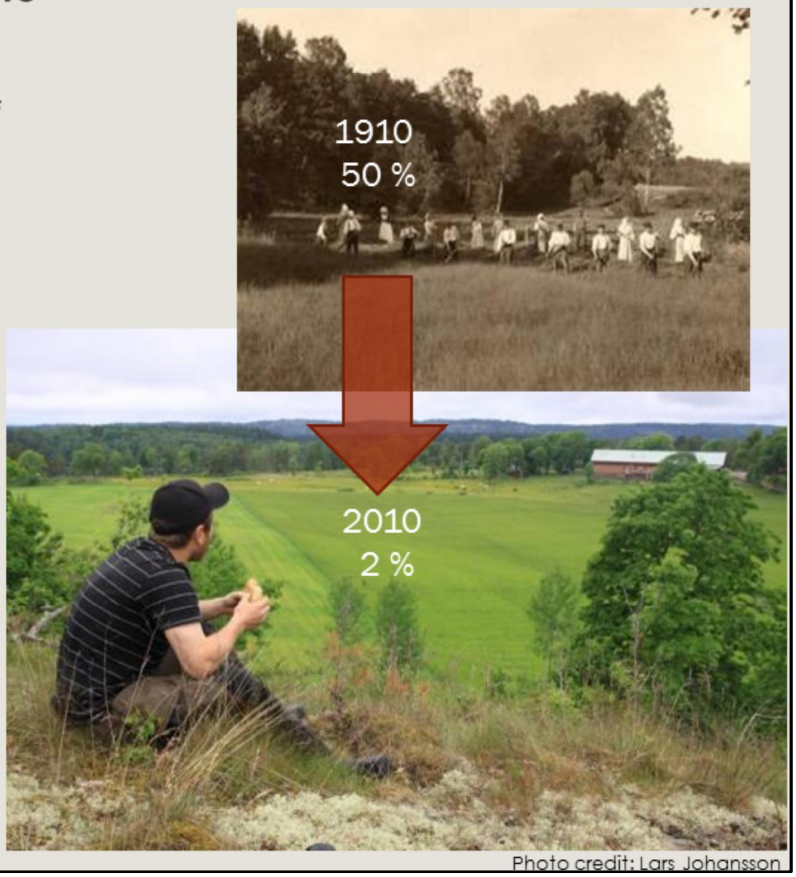


Photo credit: Lars Johansson

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%.

Intensification and extensification

2017- land use at the crossroads

Photo credit: Lars Johansson

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.

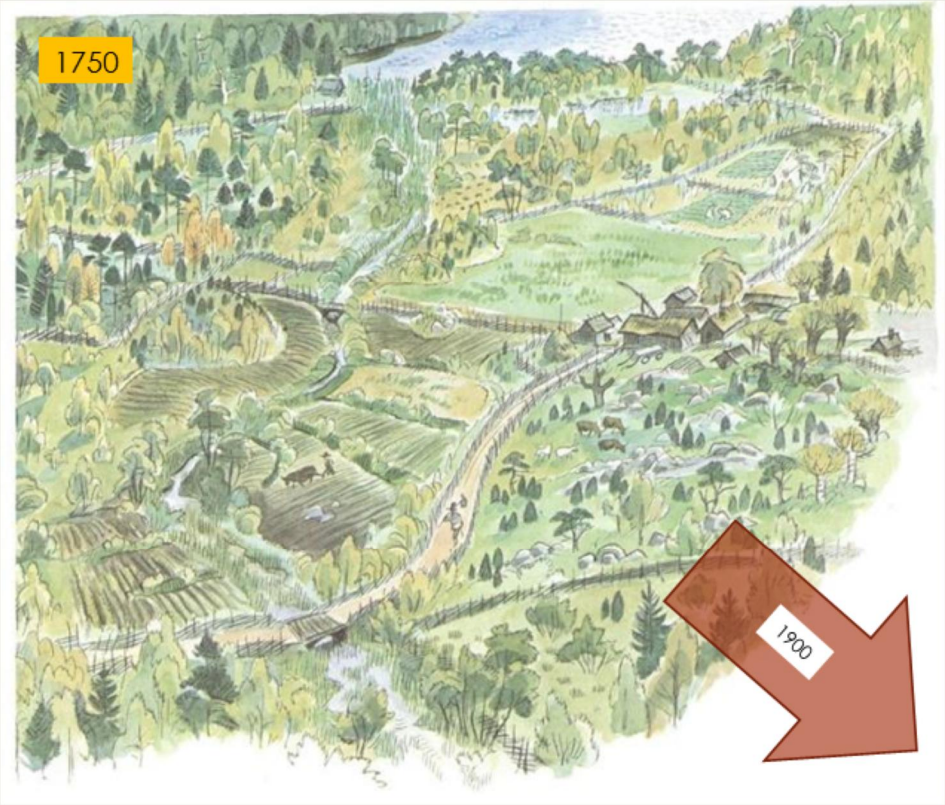
In the diversification-strategy (1) we see farmers whom use their existing resources in new ways (leasing or using machines in new ways, develop tourism activities, new food products, etc). Among the farmers who chose the strategy to add value to existing resources/products (2) we see them who process 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.

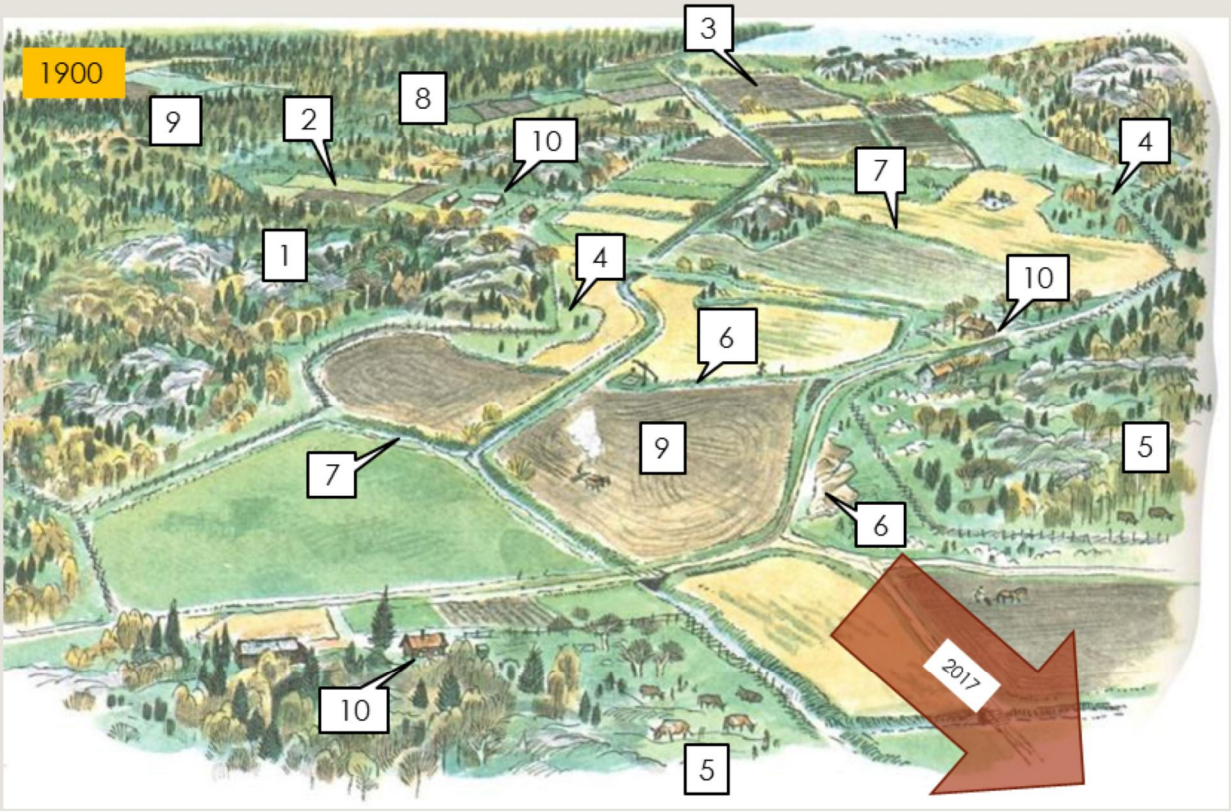
Nevertheless, the strategies chosen will impact the farming practice as well as the natural values created. To support HNV-farming means supporting farmers in different ways, depending where they are and where they are heading.

CONSEQUENCES

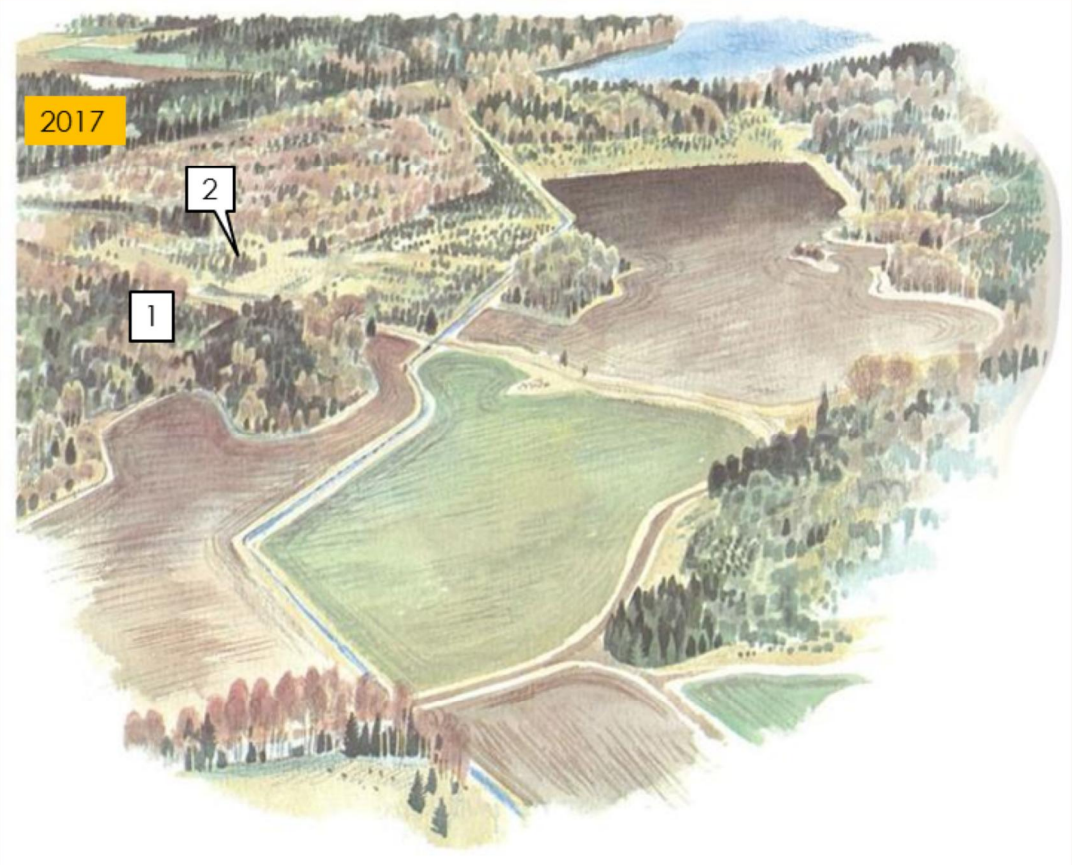
of the TRENDS and TIMELINE



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.

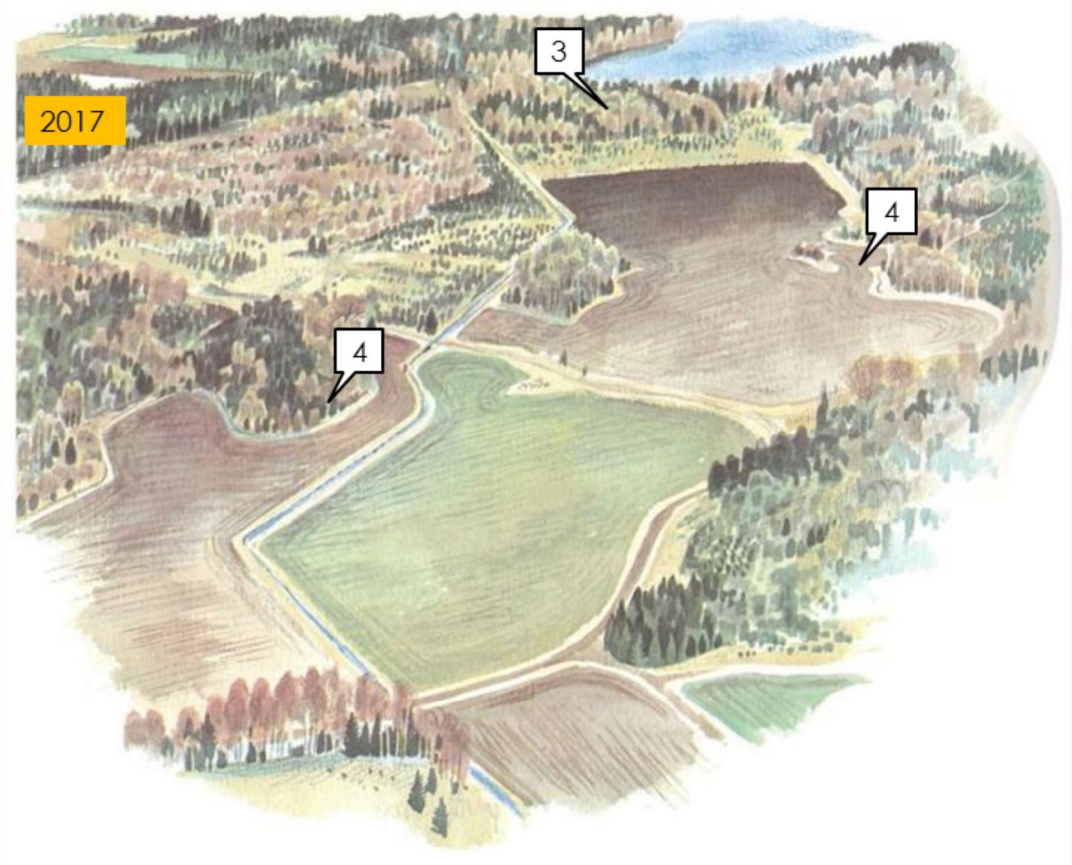


In the illustration places in the landscape are marked where obvious land use changes have taken place during the last century.



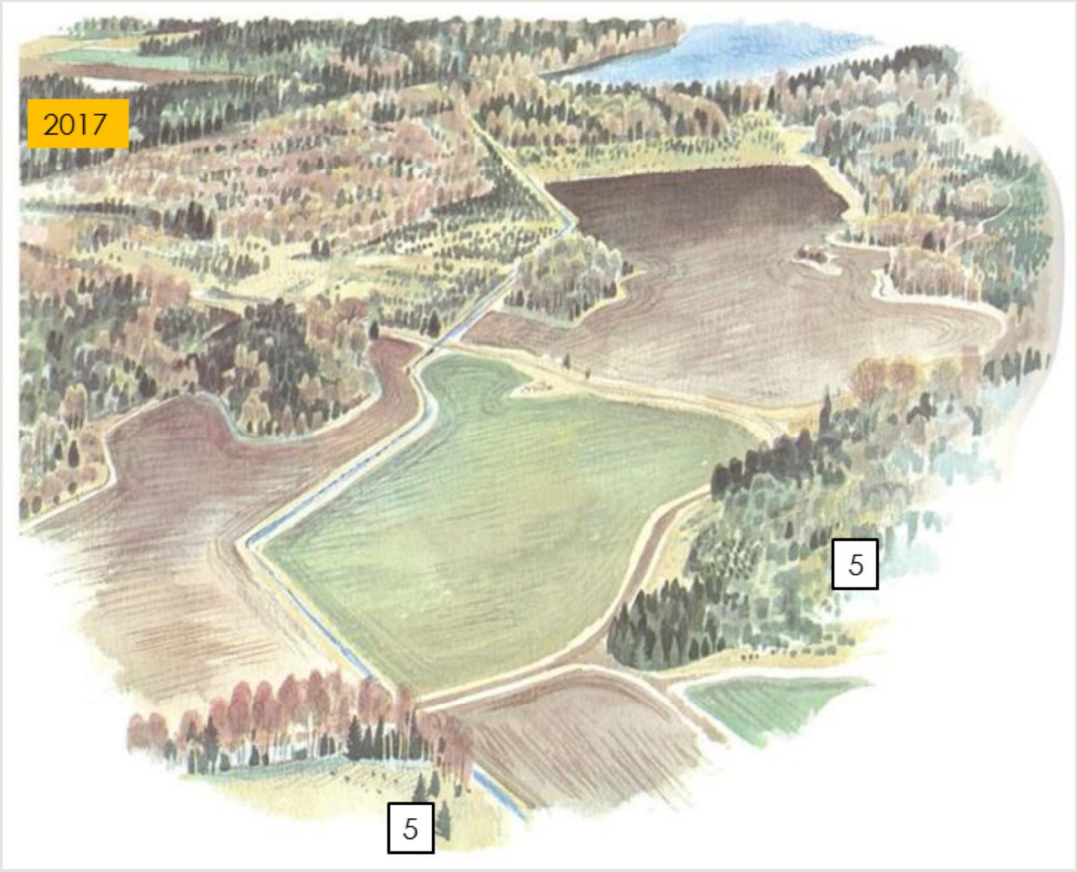
1) The decline of the outfields. The land consolidation reforms were a factor contributing to this by privatizing the commons which earlier were jointly managed and used. A more rational use of the infields, such as grass cultivation, made it easier and cheaper to harvest a larger amount of winter fodder 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.

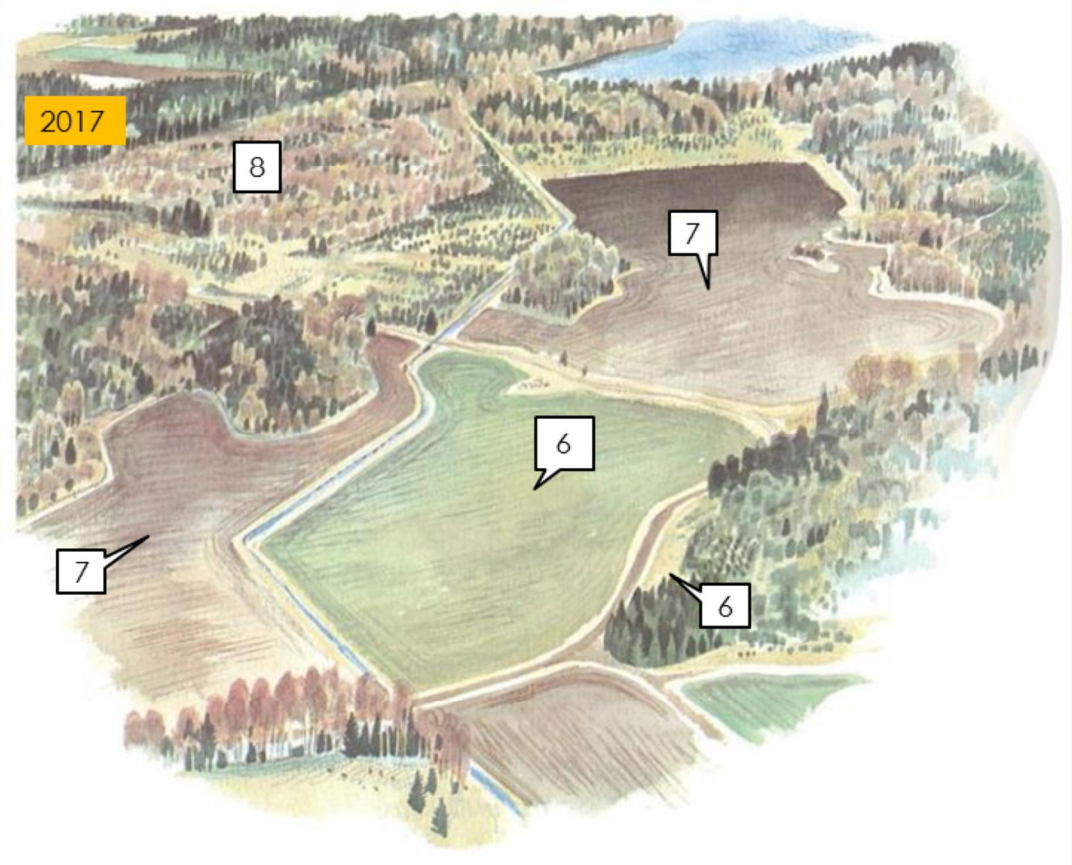


3) Arable land became forest. Much of the arable land which has been won through lake surface reduction projects could only be used for a shorter period. When the water level was lowered and when the soil was plowed, the carbon in the soils came into contact with oxygen in the air and disappeared to 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.



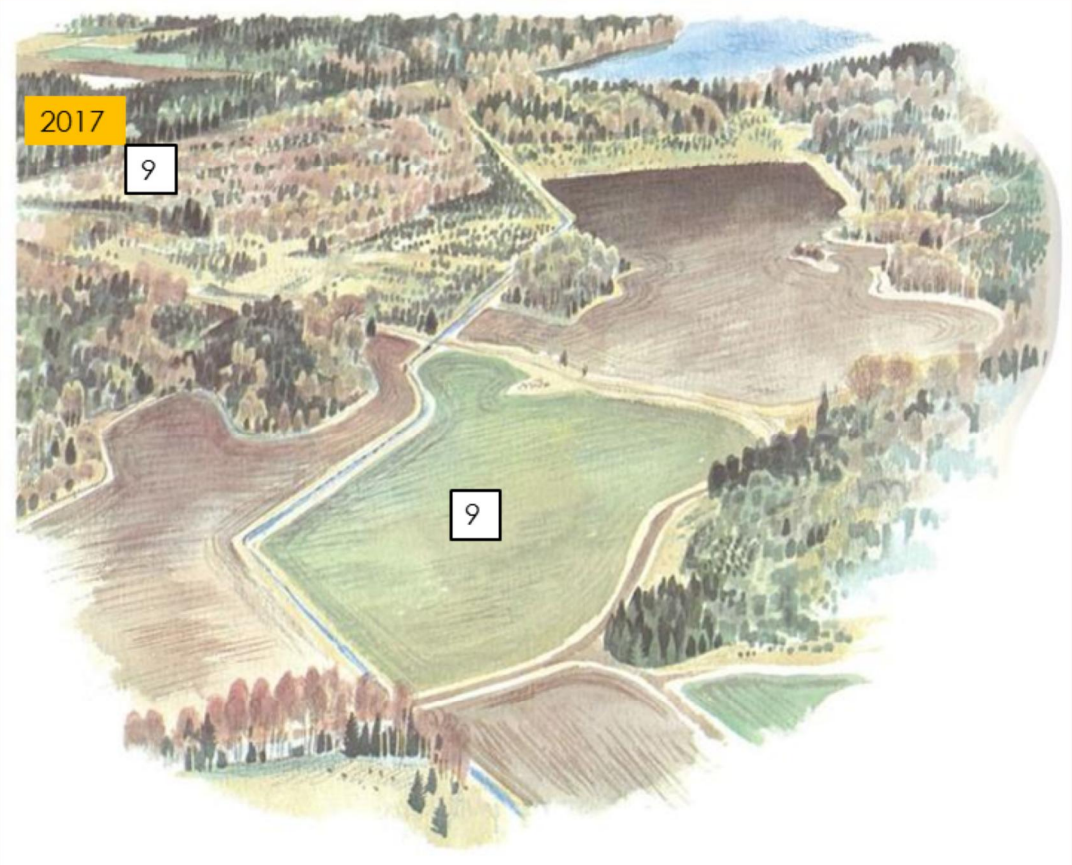
5) Pasture become forest. Pastures close to the farm were often seen as a resource by farmers even after the outfield grazing were prohibited. However, the signals from government during the rationalization period were that the natural pastures were a non-productive intermediate between arable field 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.

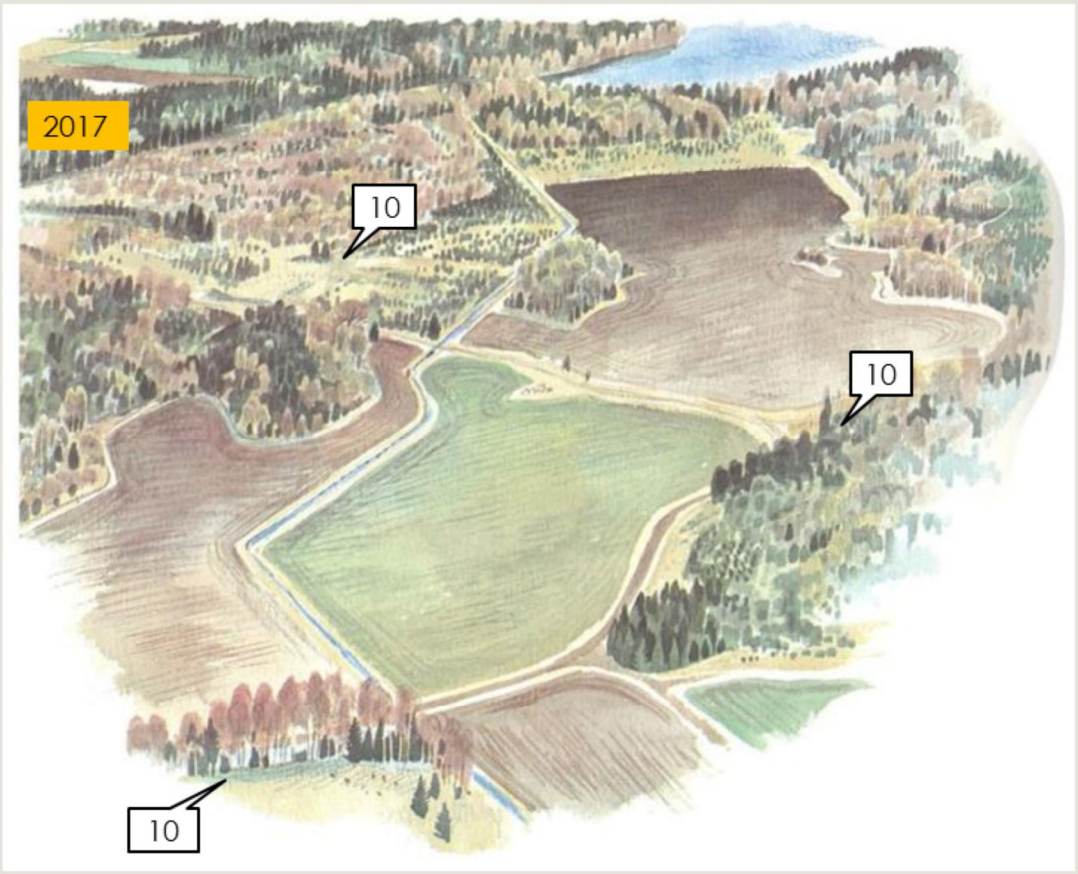


9) Use of chemicals

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.

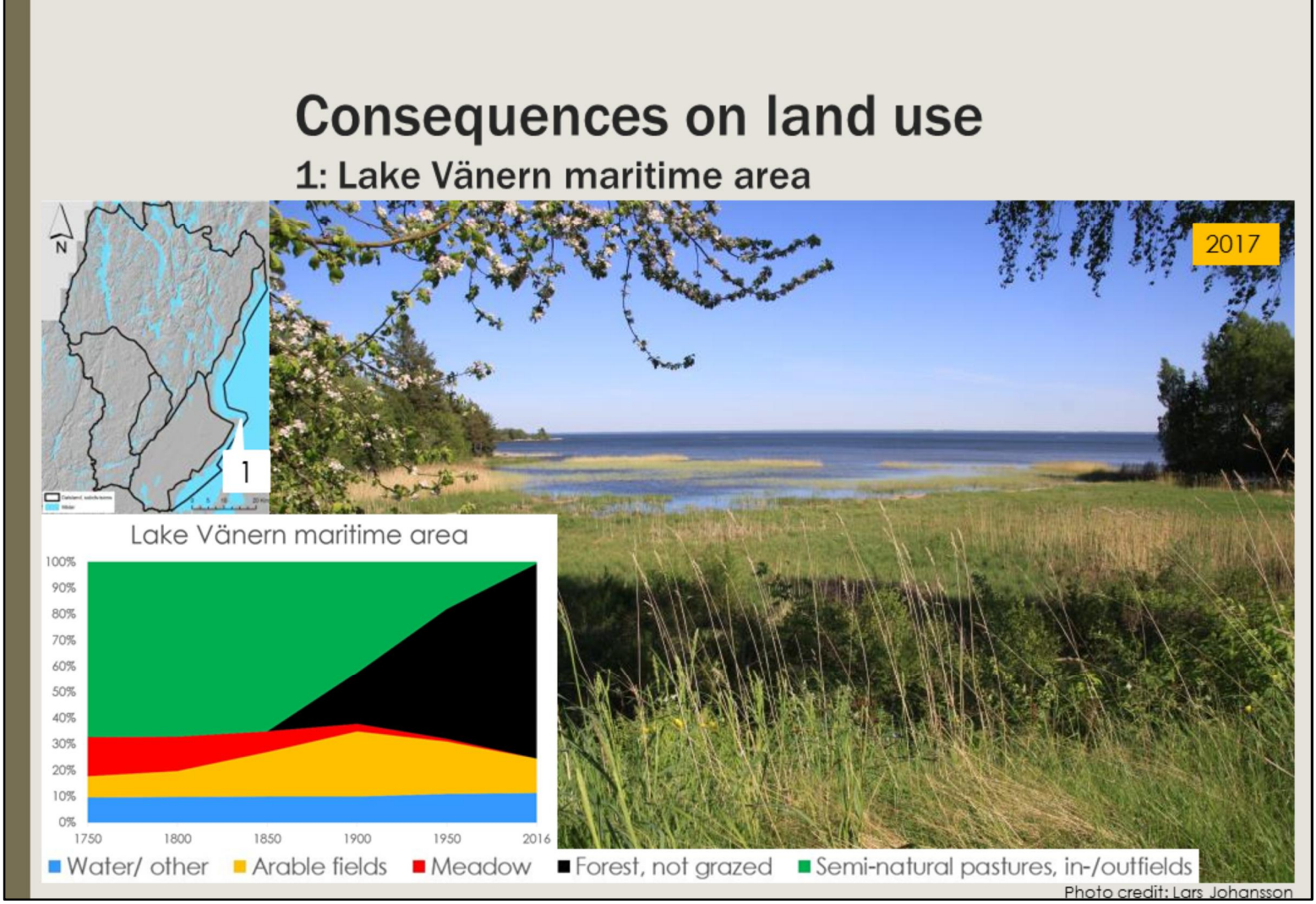
Also our knowledge of benefits and risks increases over time. We are becoming more and more skilled at retaining nutrients and chemicals in the fields and minimizing the risk of spreading it too, for example, negatively affecting the watercourses. At the same time, the insight how difficult it is to 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.



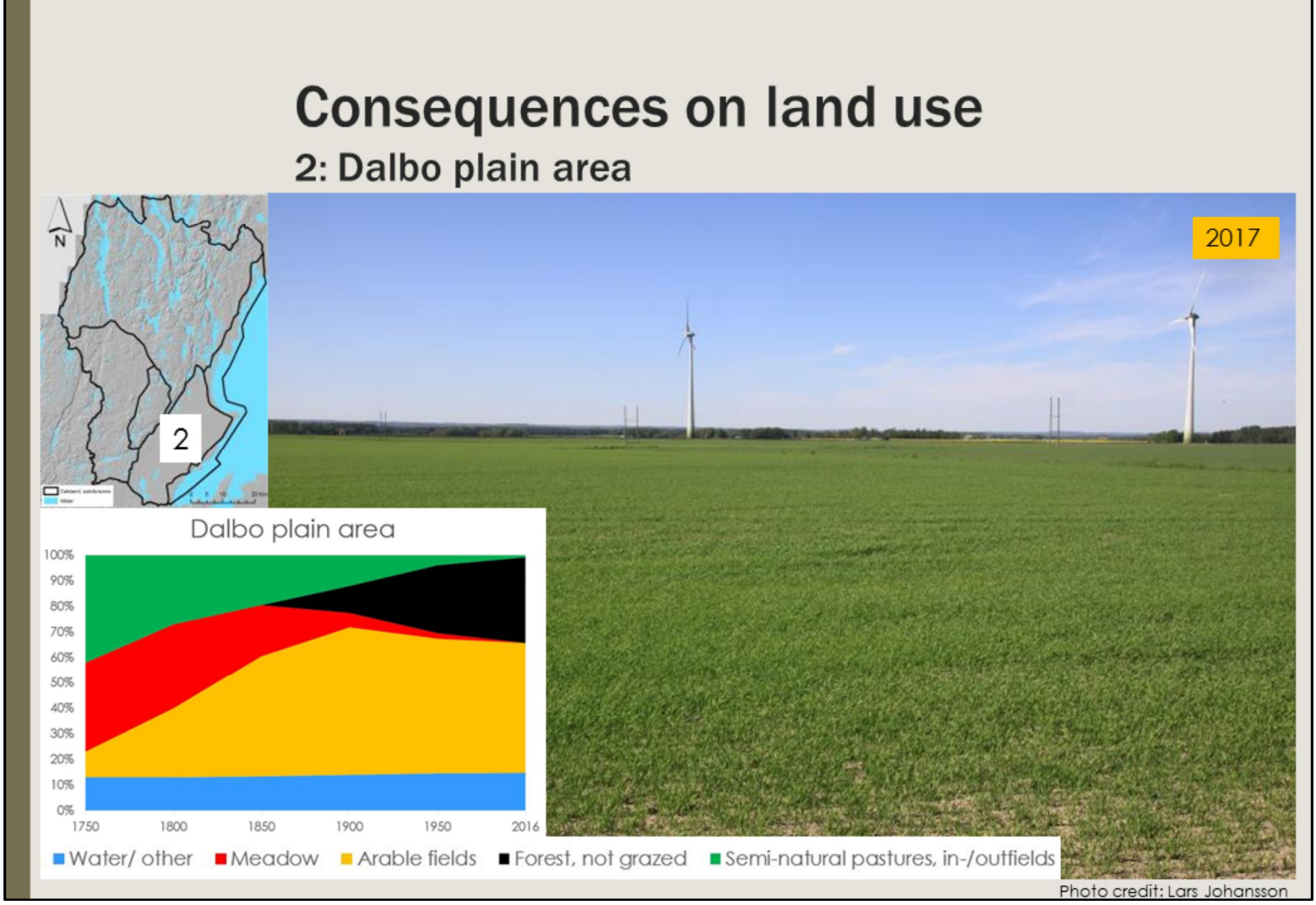
1: Lake Vänern maritime area (170 km^2)

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.

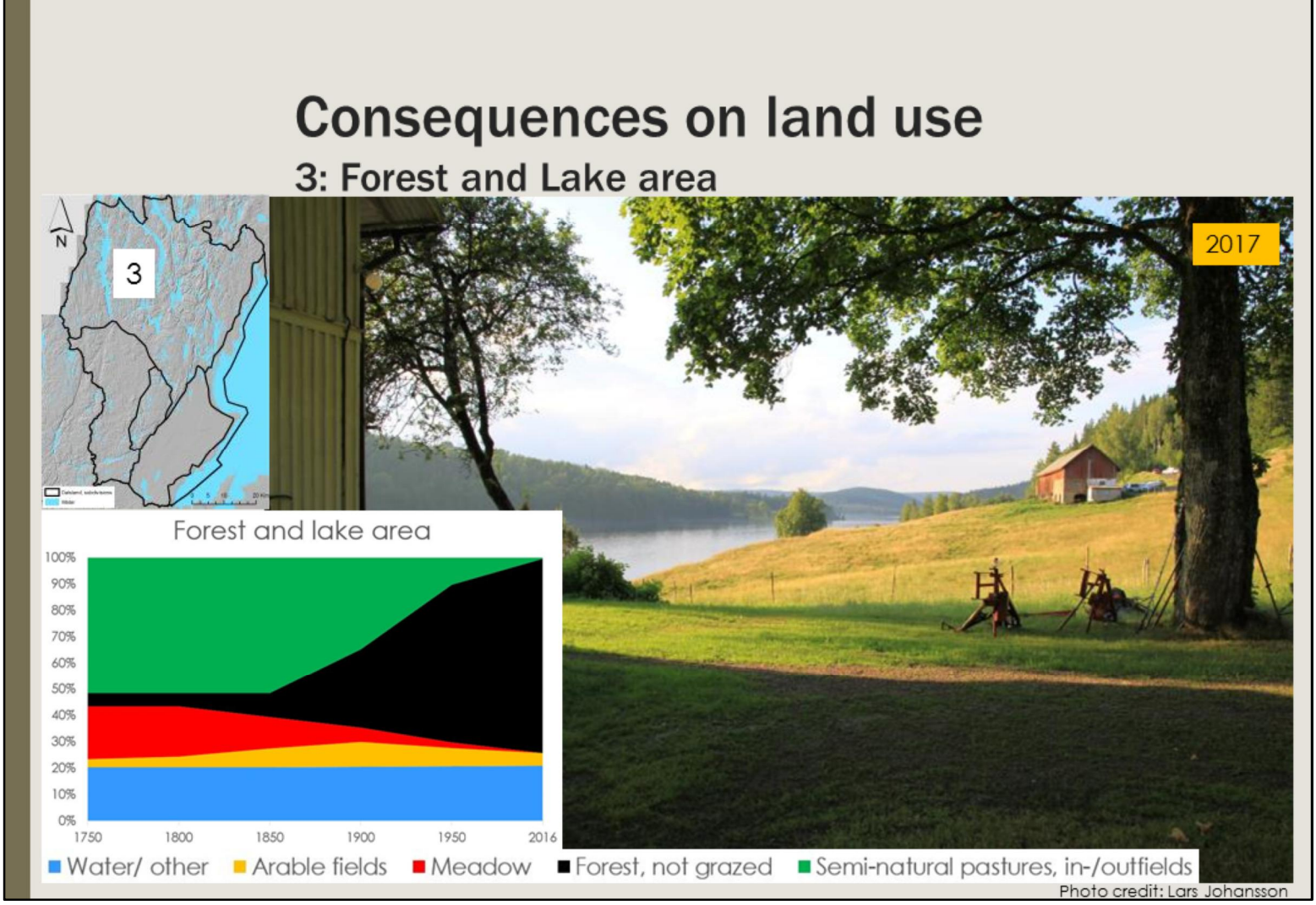
Habitats still common in the area, and which have a potential to regain HNV-qualities, are the water meadows as the one on the photo.



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.

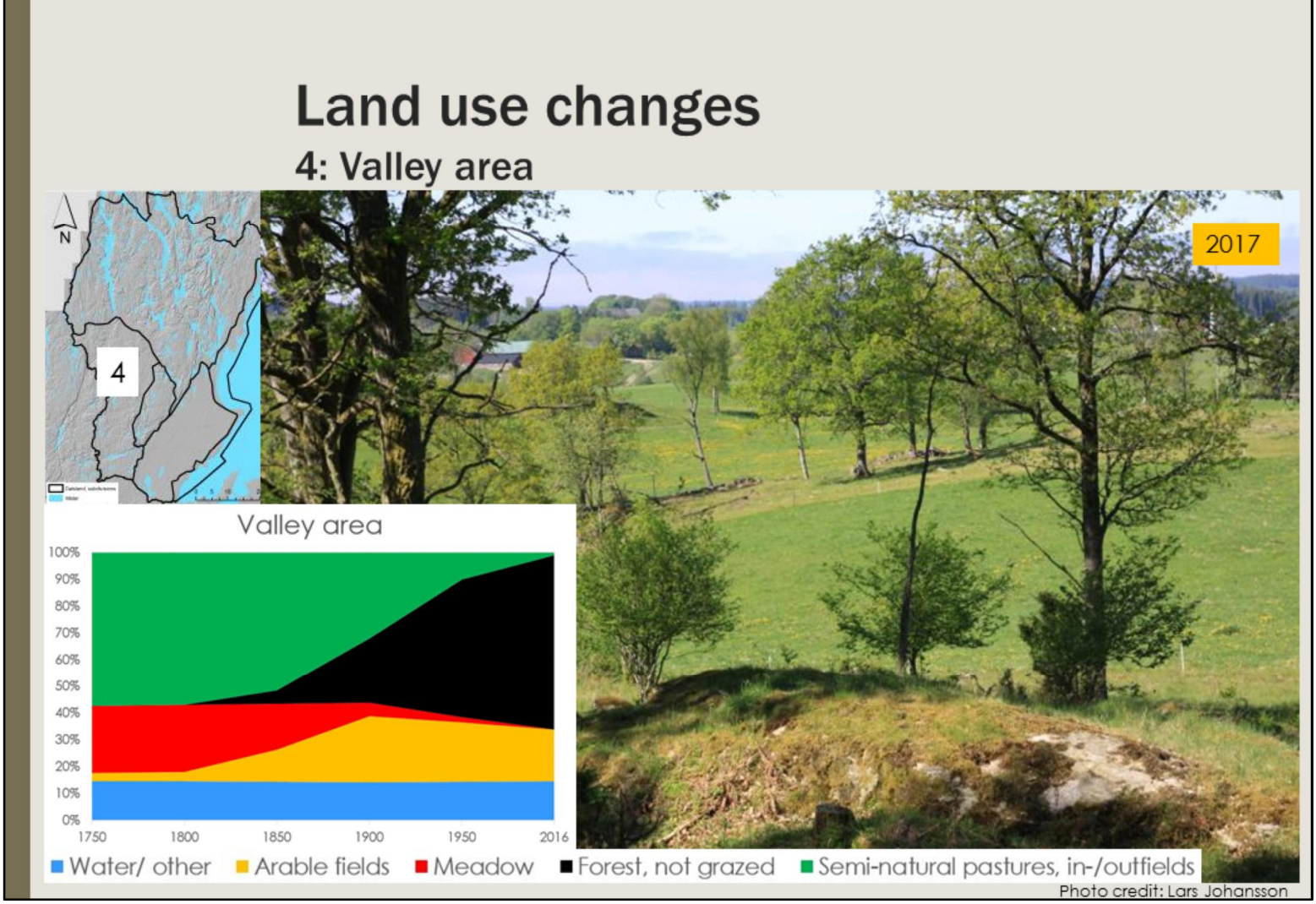
Fragments of meadows and pastures are still scattered in the landscape. In the southern part of this area there are some lowland lakes and mashes with HNV-qualities, especially from an ornithological perspective. There are good potentials to restore and increase these areas in the future.



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.

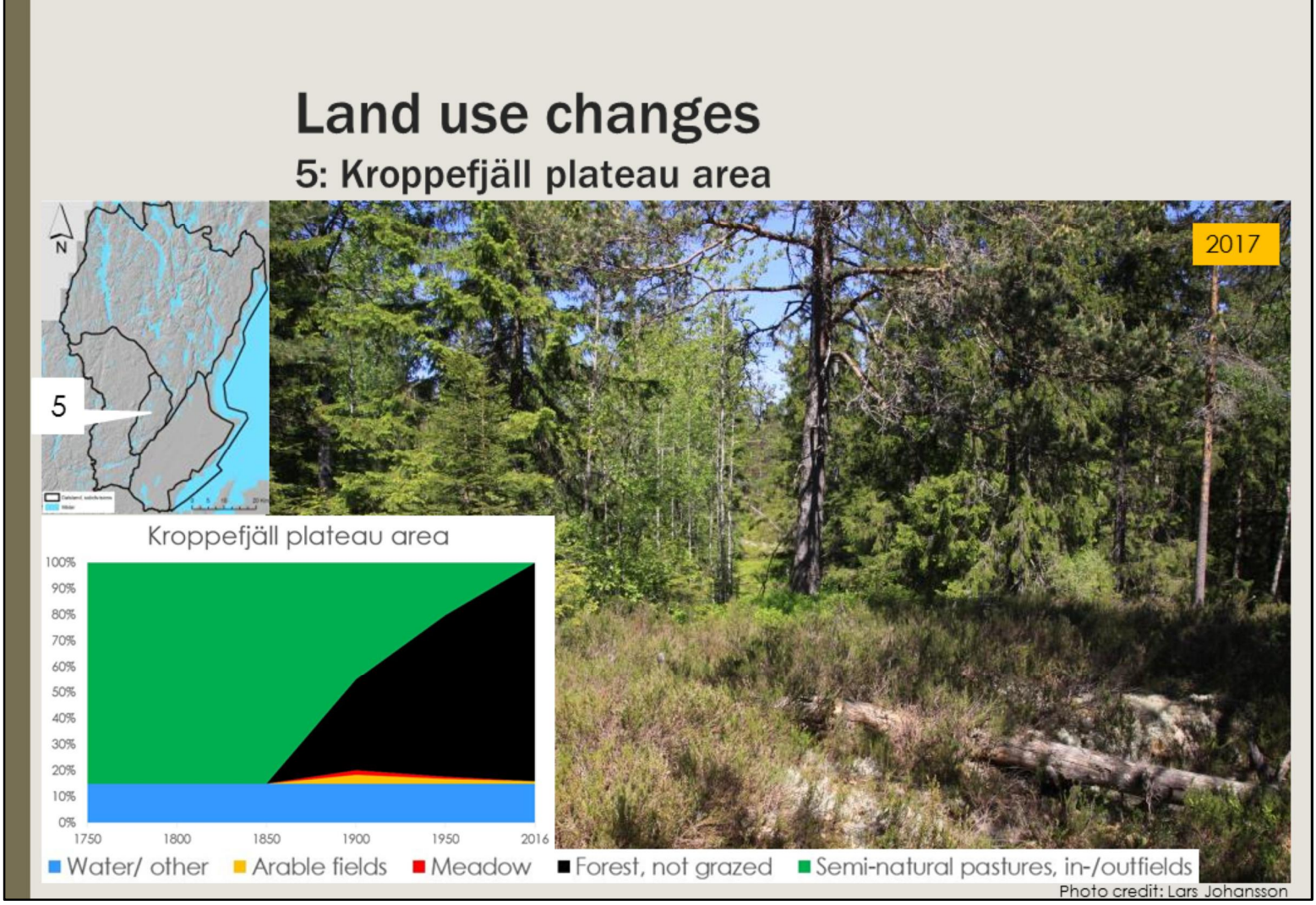


4: Valley area (750 km^2)

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.

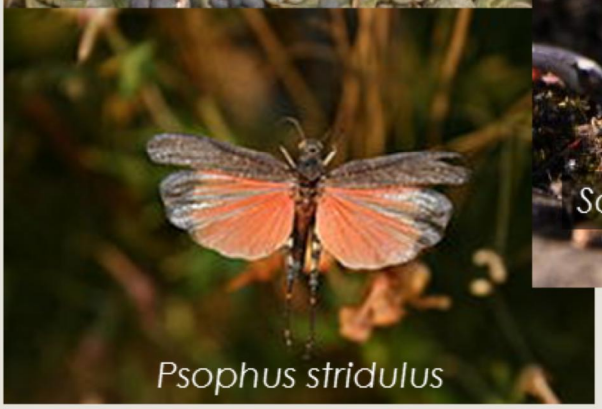


5: Kroppefjäll plateau area (190 km^2)

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.

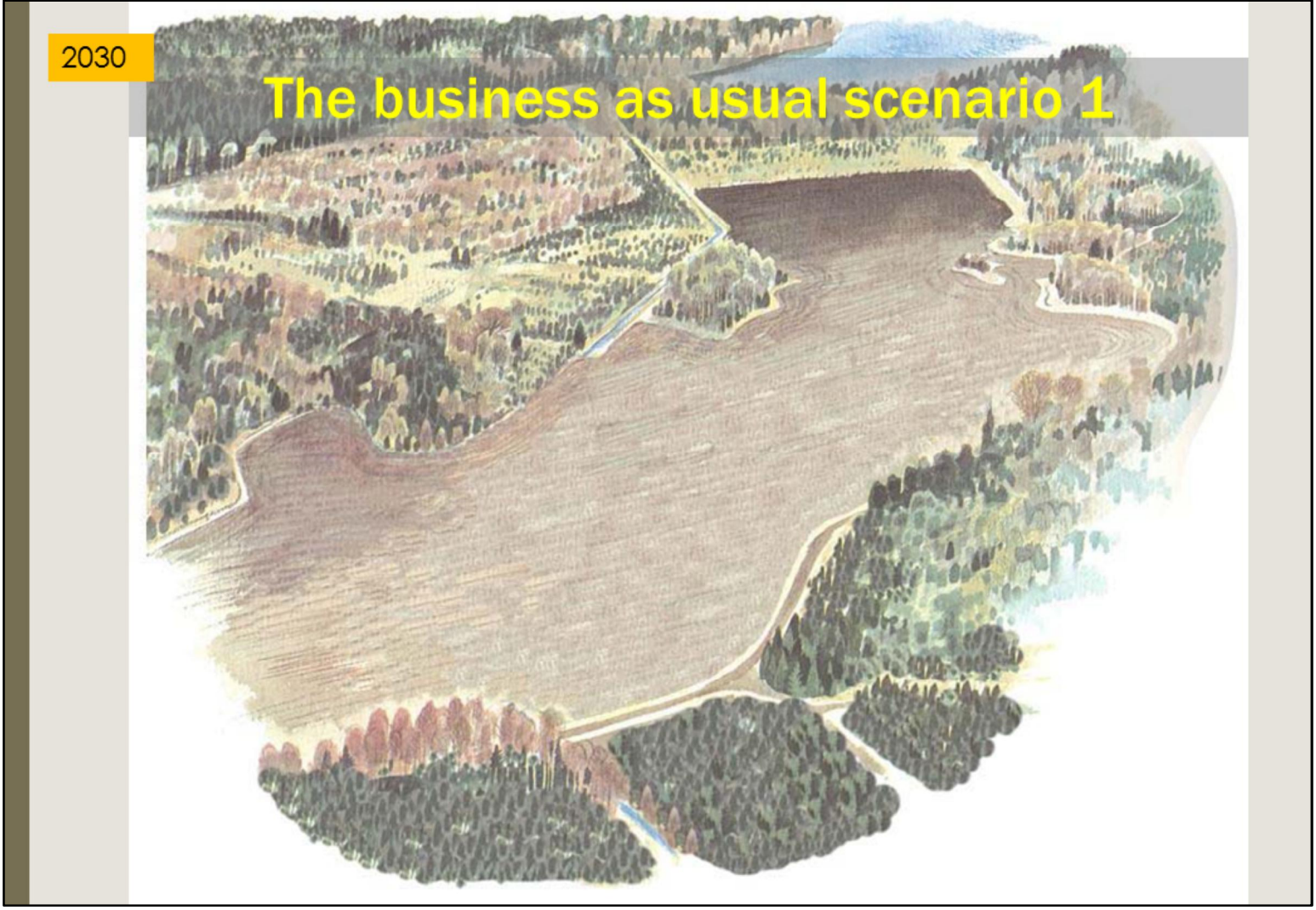
Consequences for biodiversity



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.

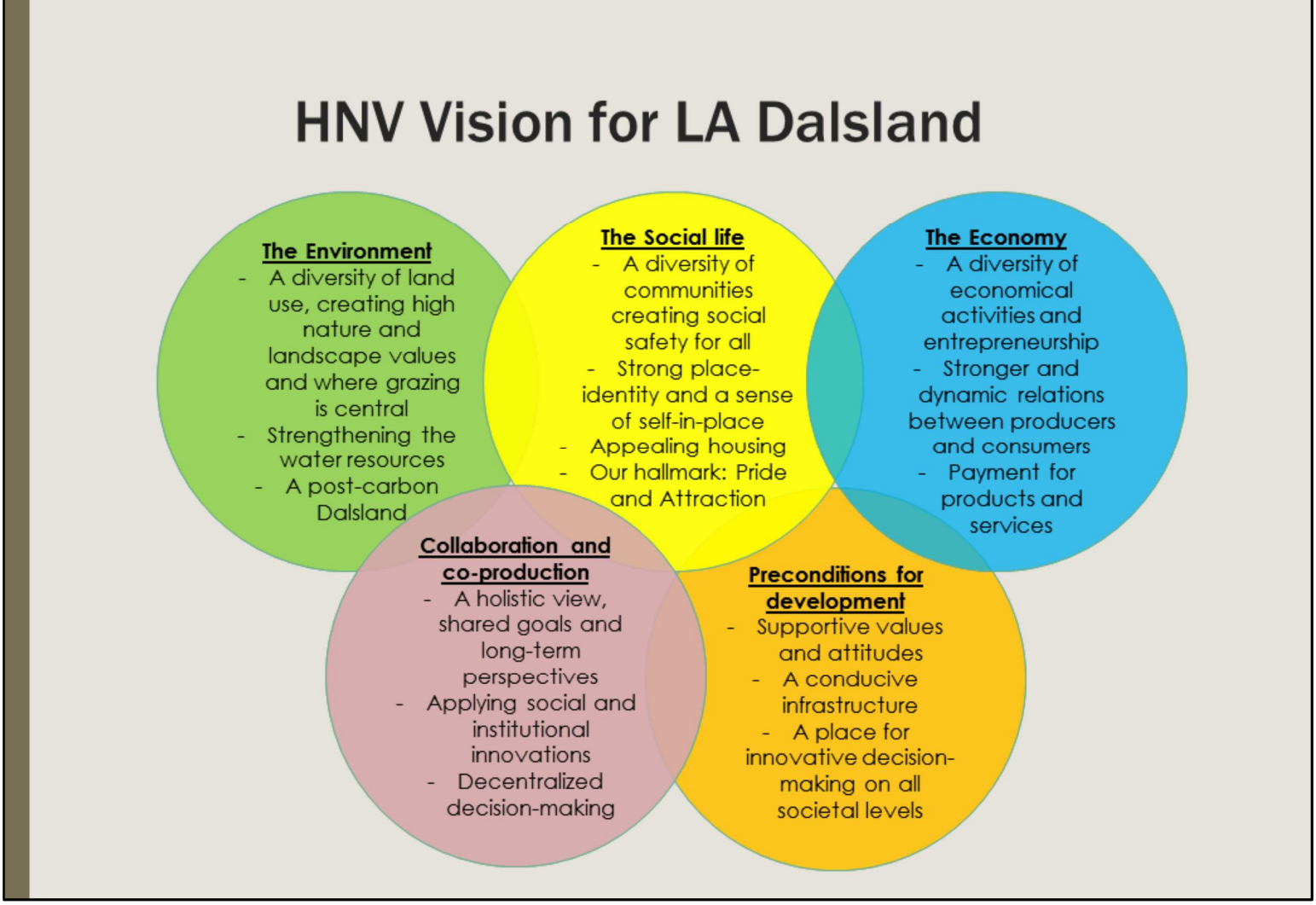
If these assumptions are correct, we believe that most decisions that will be made about measures in forestry or in agriculture will resemble those taken earlier. This means that it will continue to be important to reduce the time and cost of land management, increasing efficiency in all steps of the 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.

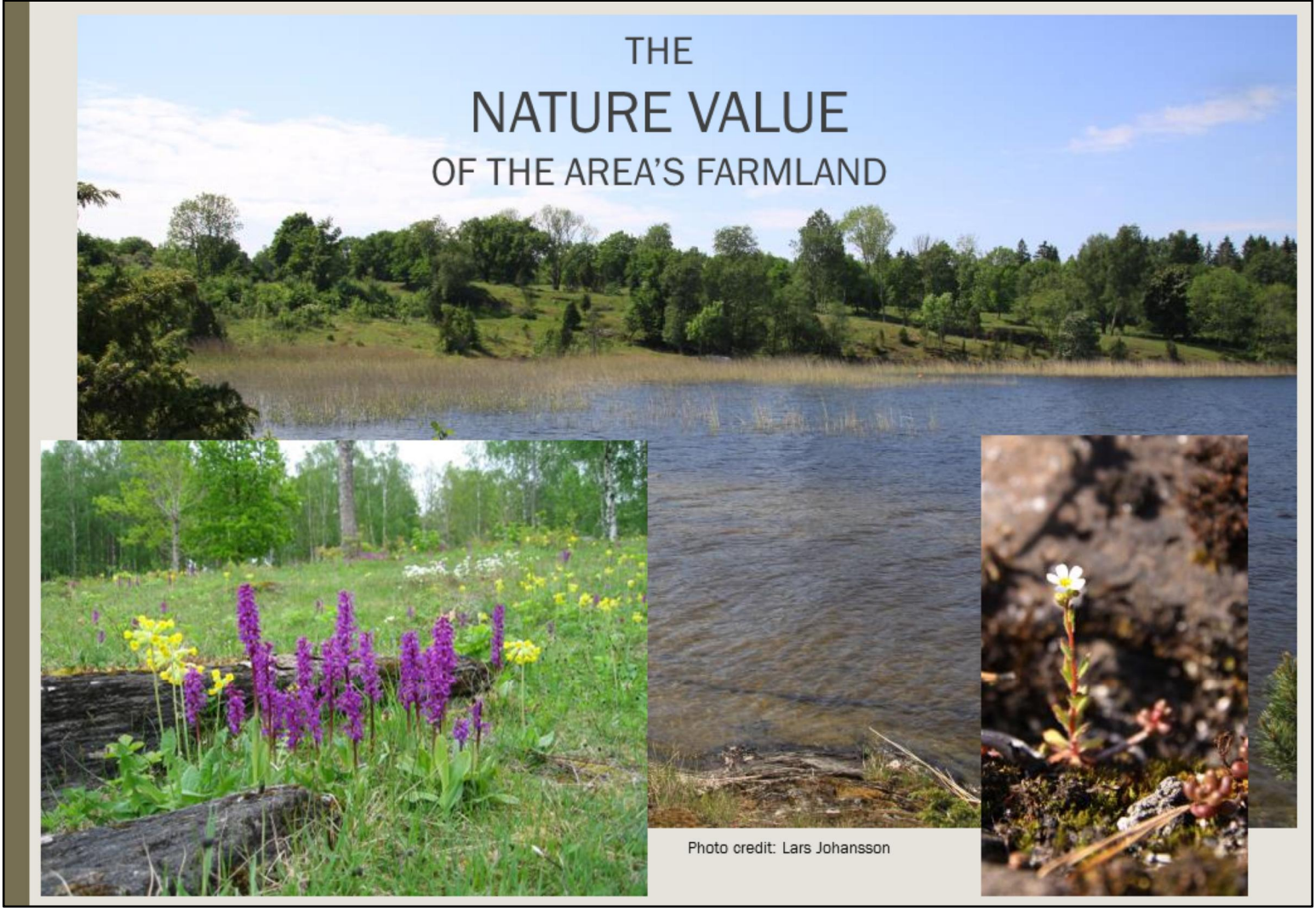


During the winter and spring of 2017 seven workshops were carried out as part of the HNV-LINK project in Dalsland, in which fifty different individuals took part. At the meetings, the participants have worked with three main issues:

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.

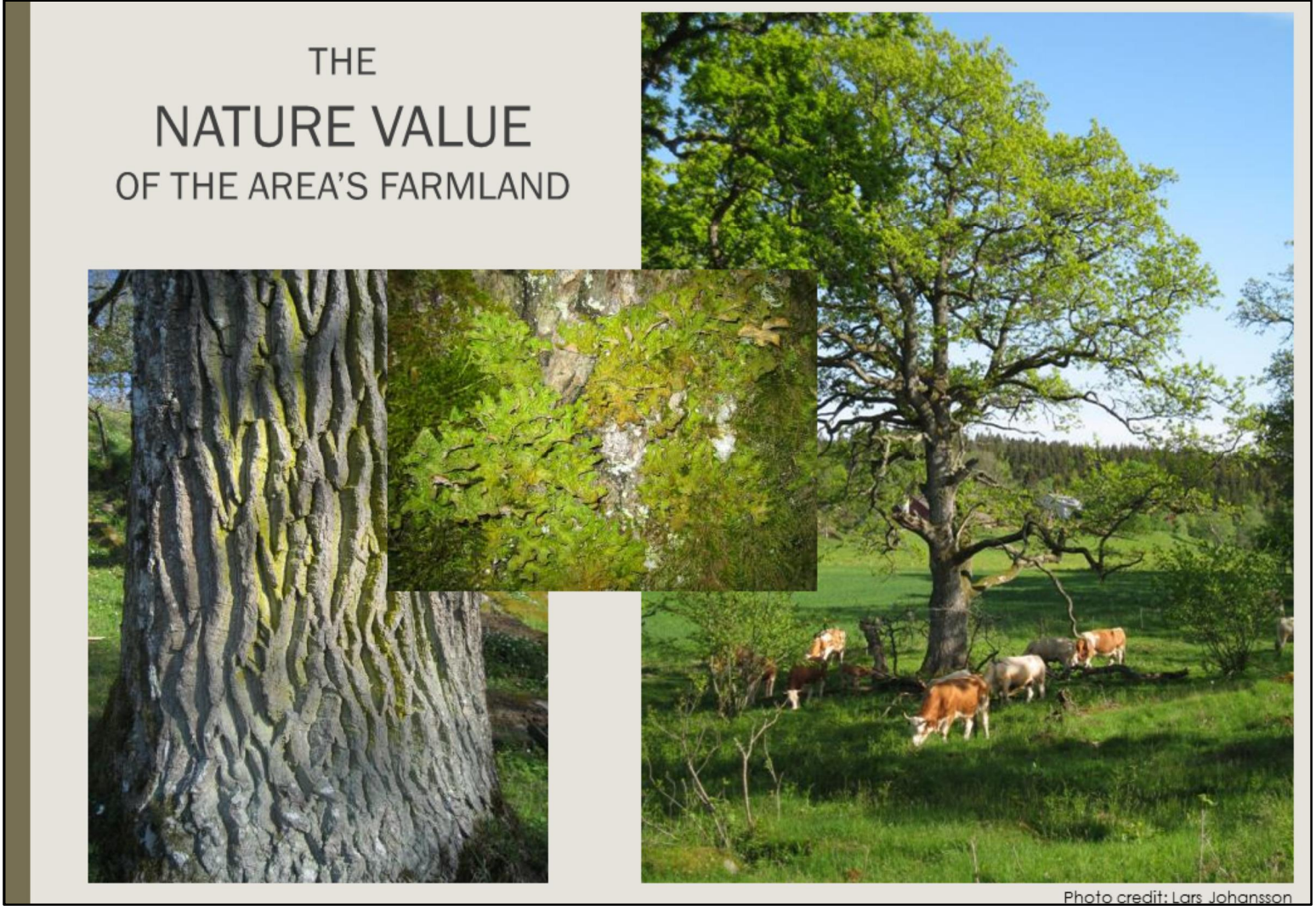
Calcareous flatrocks in this area are easily eroded, producing lime-rich soils. Earlier in history most of these lime-rich schist areas were managed as grasslands or mown meadows. Grazing and the trampling of hooves exposed large areas of the bedrock to the action of sun, wind and rain. But when grazing 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

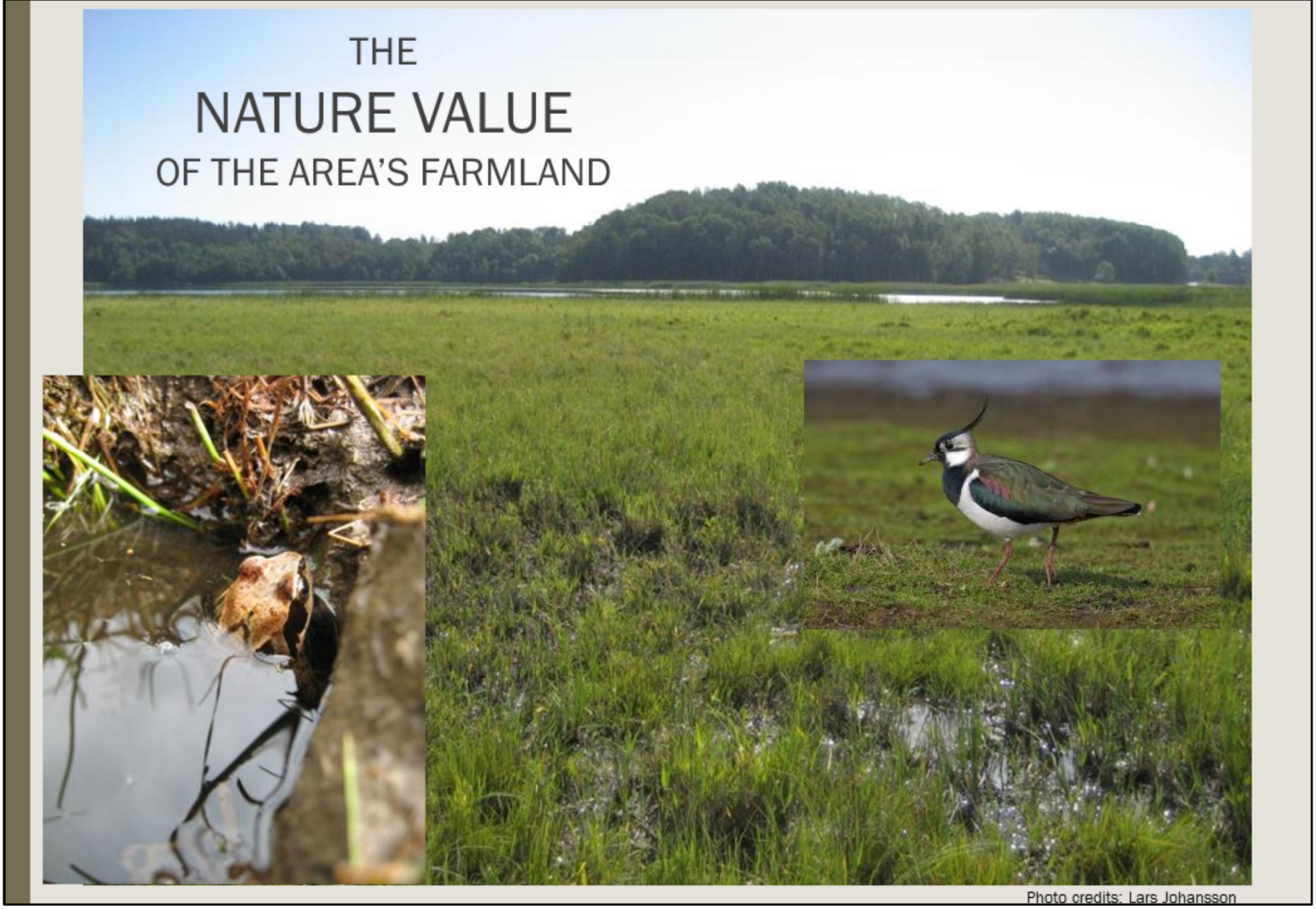


Spread out in the landscape you will find different types of grasslands with trees. These were often historically used as meadows and often today have large veteran trees, many of them oak.

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.

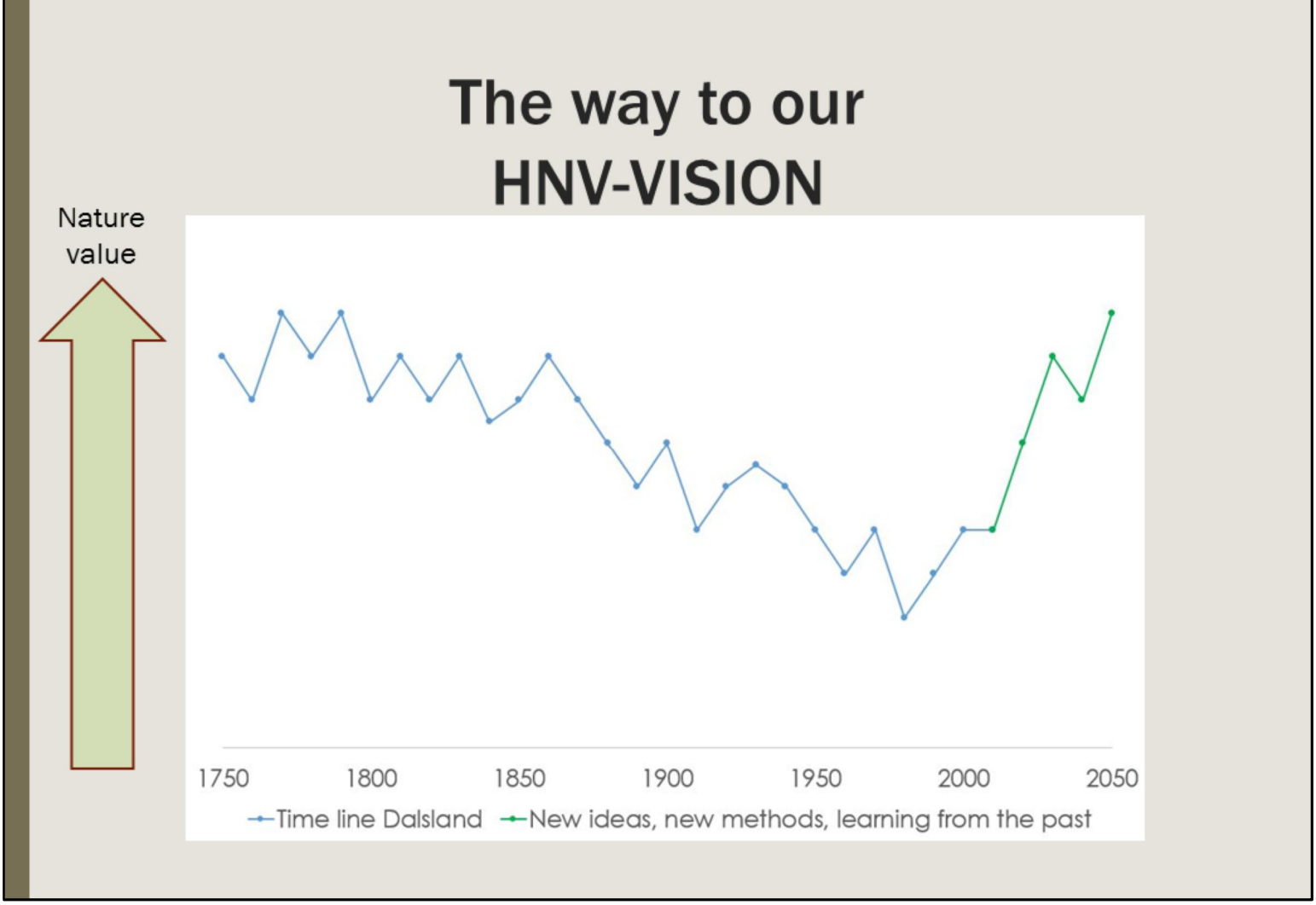
Relevant Natura 2000-category: 9070 Fennoscandian wooded pastures



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



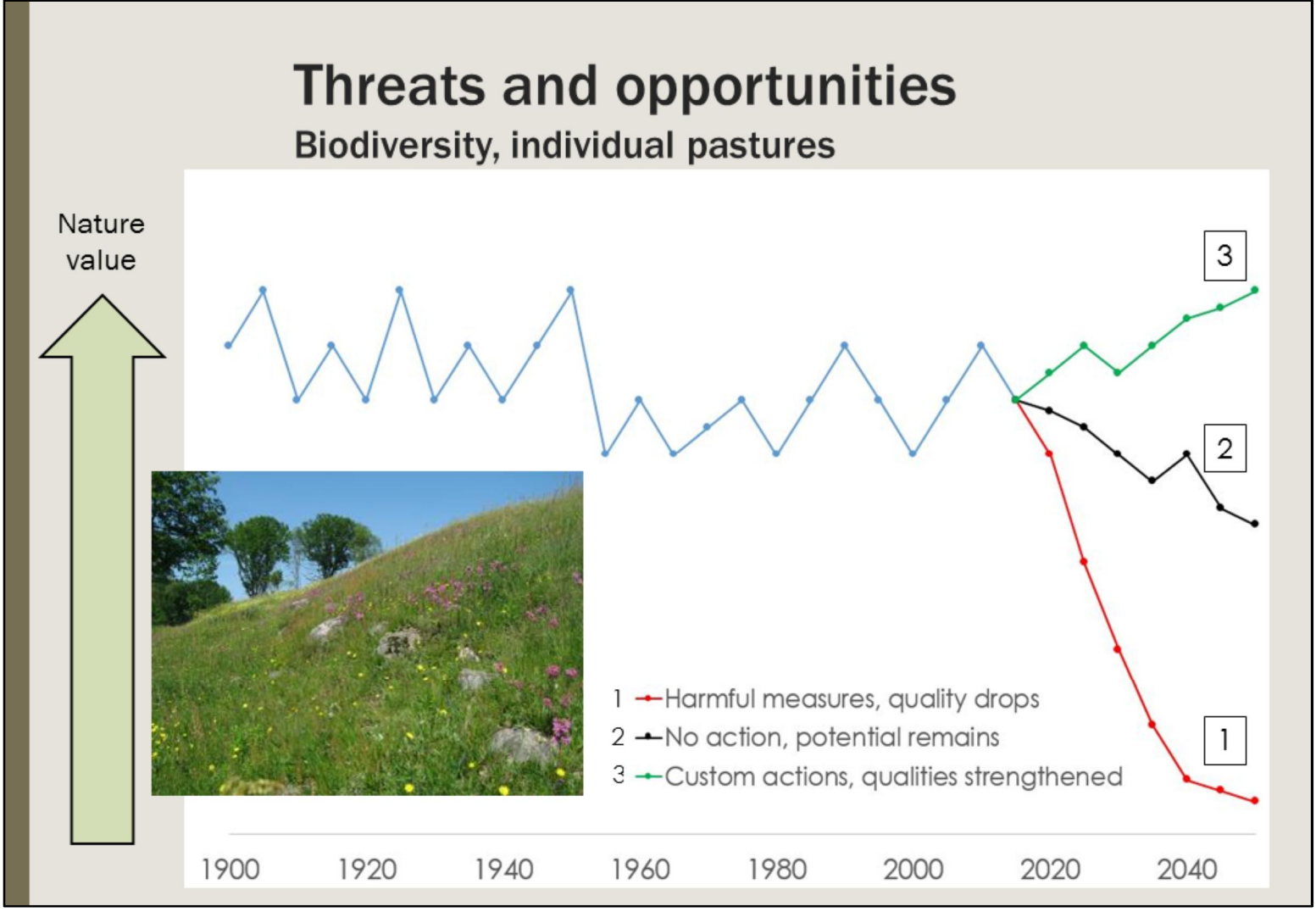
How can we reach our vision? How to avoid ending up in a Business As Usual scenario? Both these questions are interwoven, but we have chosen to look back in time in order to better understand today's situation and future potentials.

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.

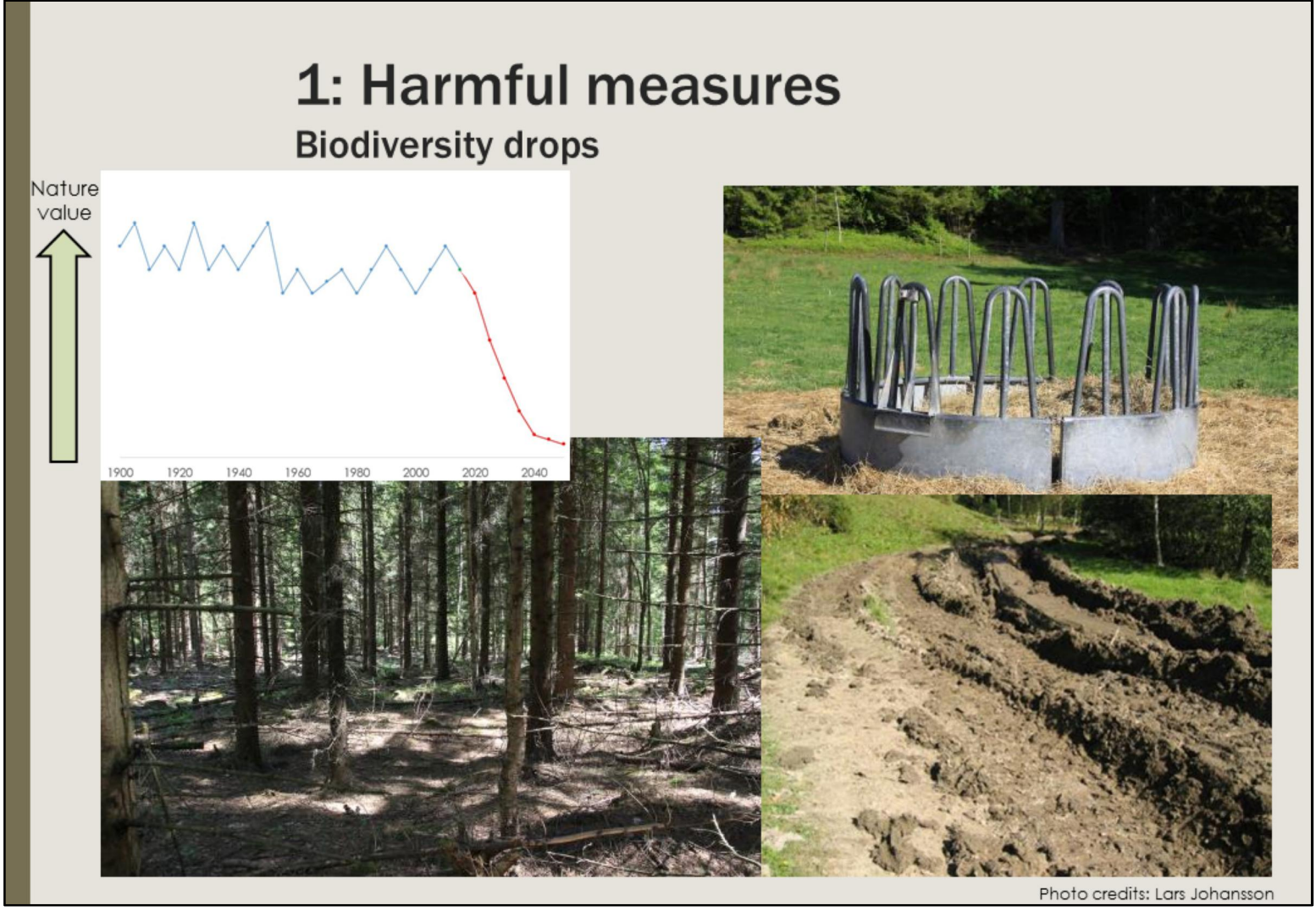
How do we achieve this? One way to think about it is to see the landscape as a puzzle. The entire puzzle can be difficult to solve immediately. But if we take a bit at a time and work systematically, making progress by each piece of action, we will probably be able to solve the entire puzzle in the long 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?

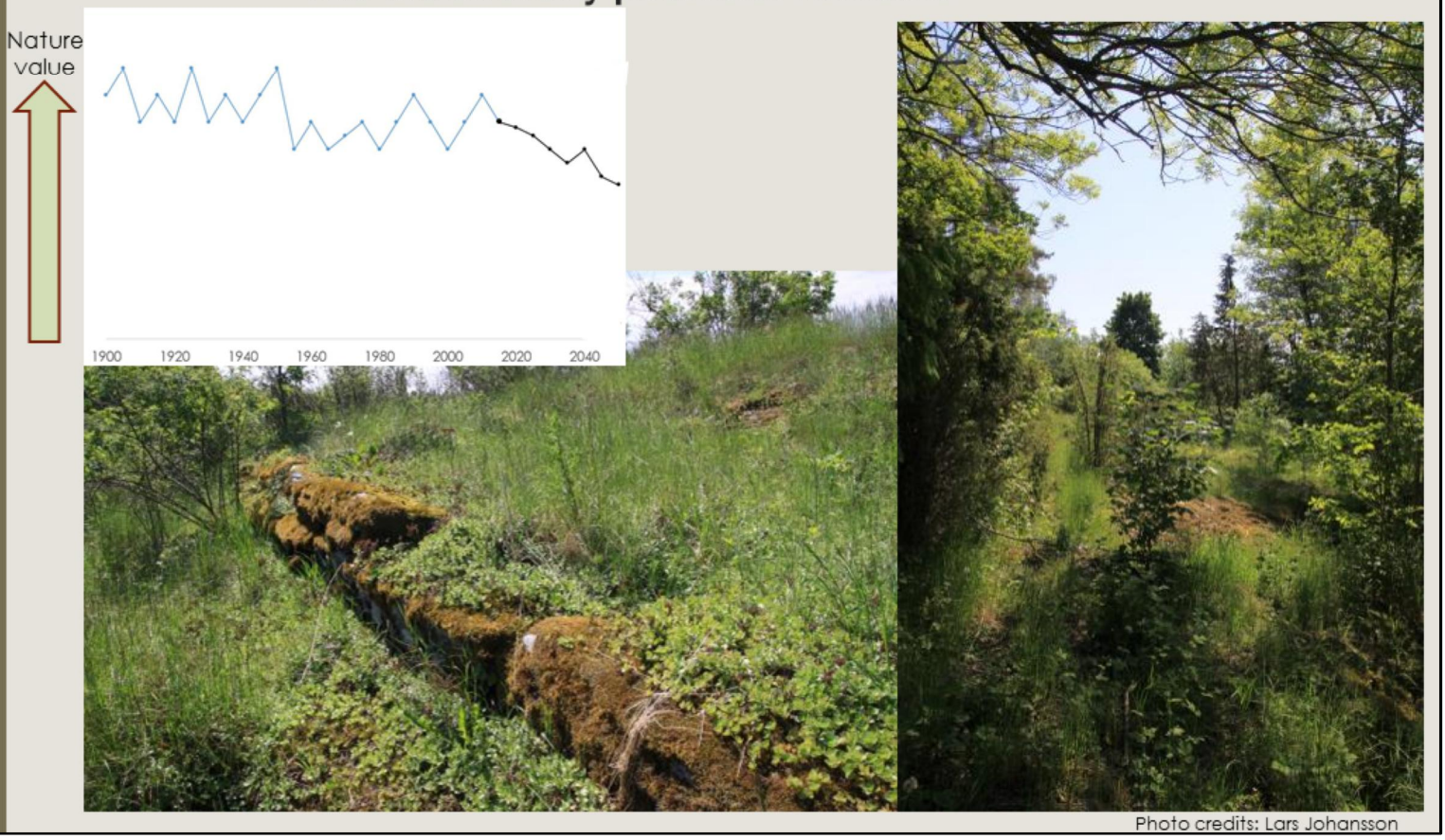
Which of the scenarios one, two or three will be realized? Of course, it depends on what measures are being implemented from now onwards. The next pages give examples of what this may mean.



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.

2: No action

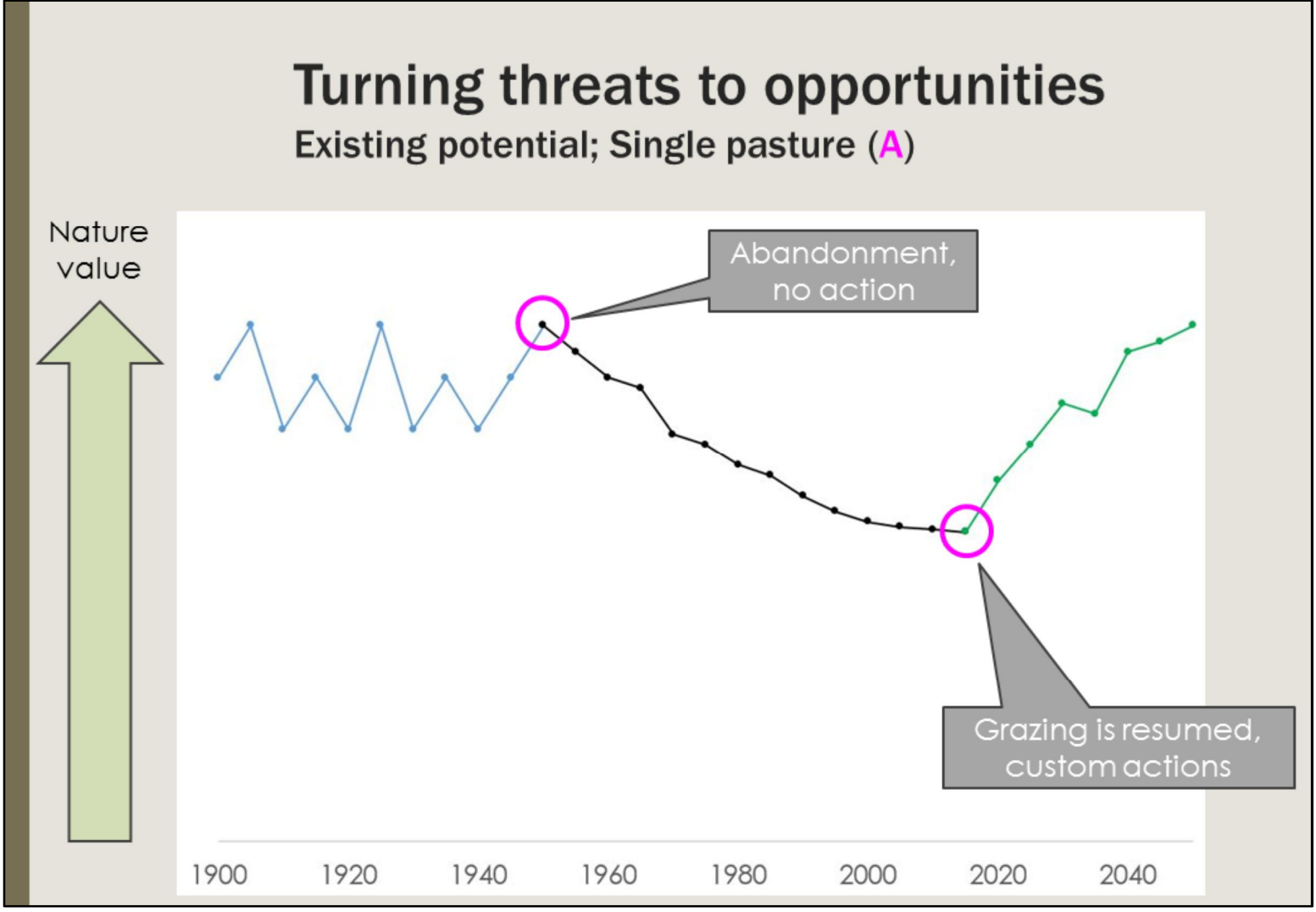
The biodiversity potential remains



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.

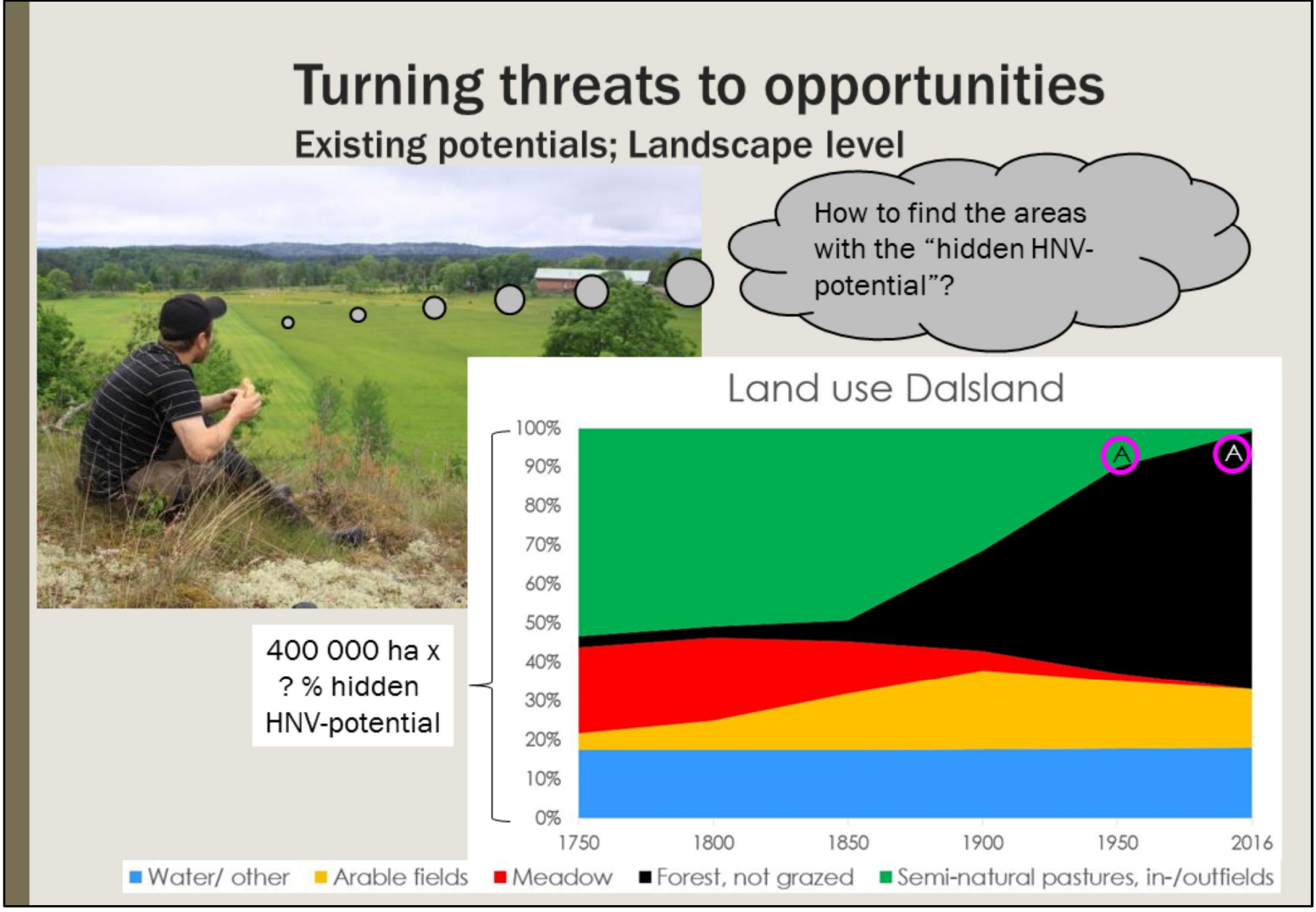
The pasture in the picture were found to contain a number of plants that indicate a mowing history; historical maps confirmed this. Based on that historical management, grazing was adapted in a variety of ways. For example, cattle got access to the land later in the season, at the same time as it was 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:

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