

# ‘Landbruk’, value creation, and woodlands in southwest Norway

“Farming (*landbruk*) has historically always devoted itself to value creation from all available natural resources” - Per Skorge, Secretary General Norwegian Farmer’s Association, 2017.

**Duncan Halley**

[www.nina.no/english/Home](http://www.nina.no/english/Home)

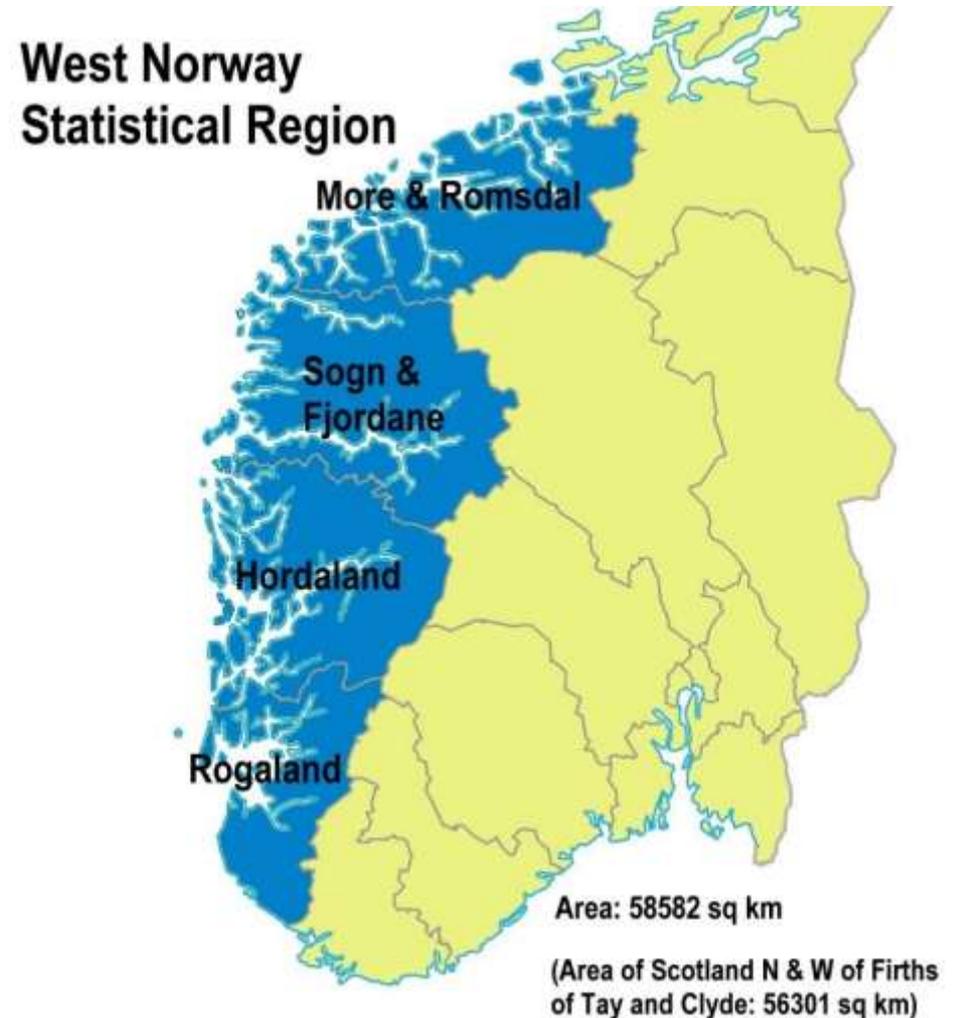
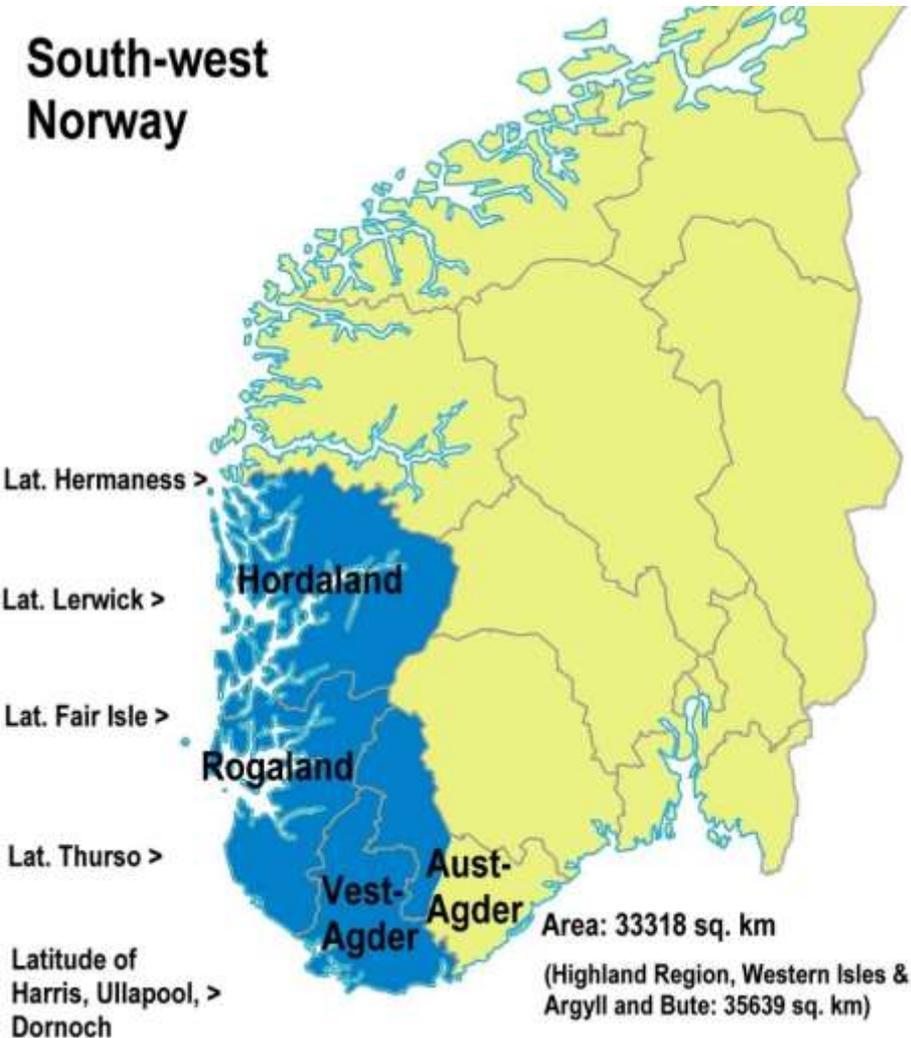
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# 'Landbruk' – Land use

- 'Landbruk' (*pron. 'landbrook'*) is a central concept in understanding how land is used in Norway.
- 'Landbruk' literally translates as 'Land Use'
- But is usually translated into English as 'farming' or 'agriculture'. This can be misleading.
- 'Landbruk' is a wider concept. It means making a living from the land, most usually from diverse sources.
- Usually several income generating activities are carried out on any given piece of land, by the same owner/occupier landowner. Monocultural use is rare, except on '[agricultural fields](#)' (arable and inbye grazing), which are 2.7% of Norway.

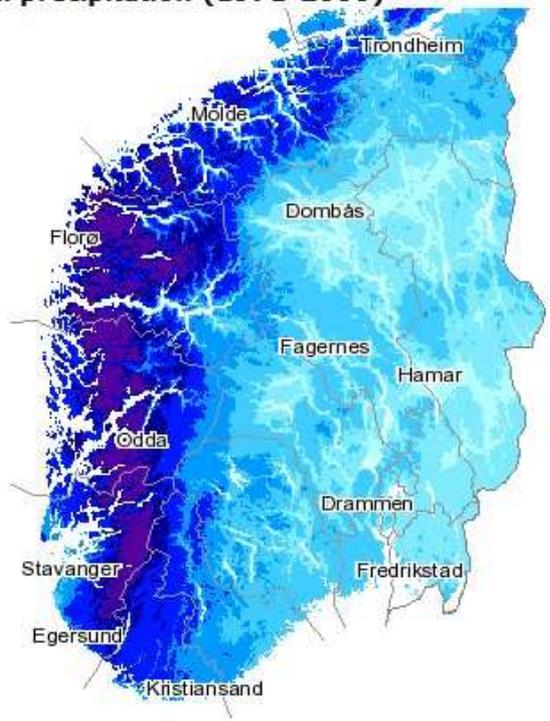


# Geographical Definitions



# Climate comparisons

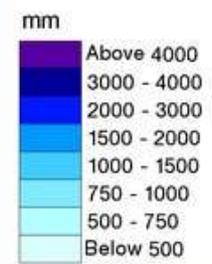
Normal annual precipitation (1971-2000)



Theme information

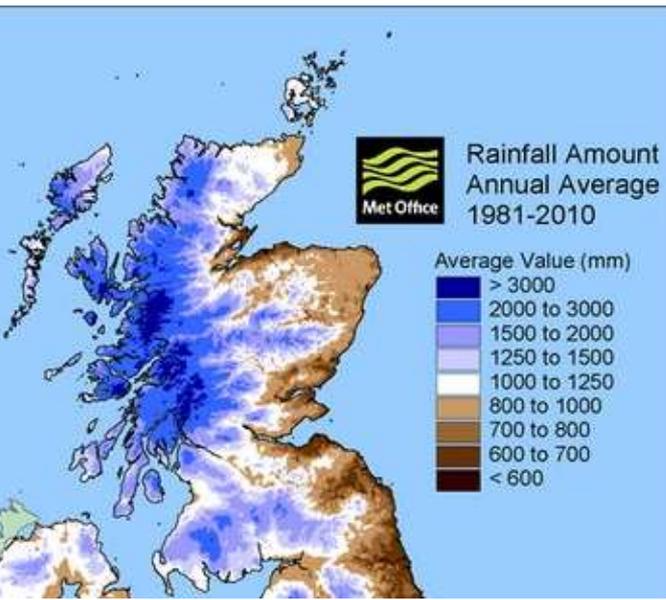
Map shows normal annual precipitation (in mm) for normal period 1971-2000.

Colour legend



Map legend

- Oslo Placename
- National boundary
- County boundary
- Lake



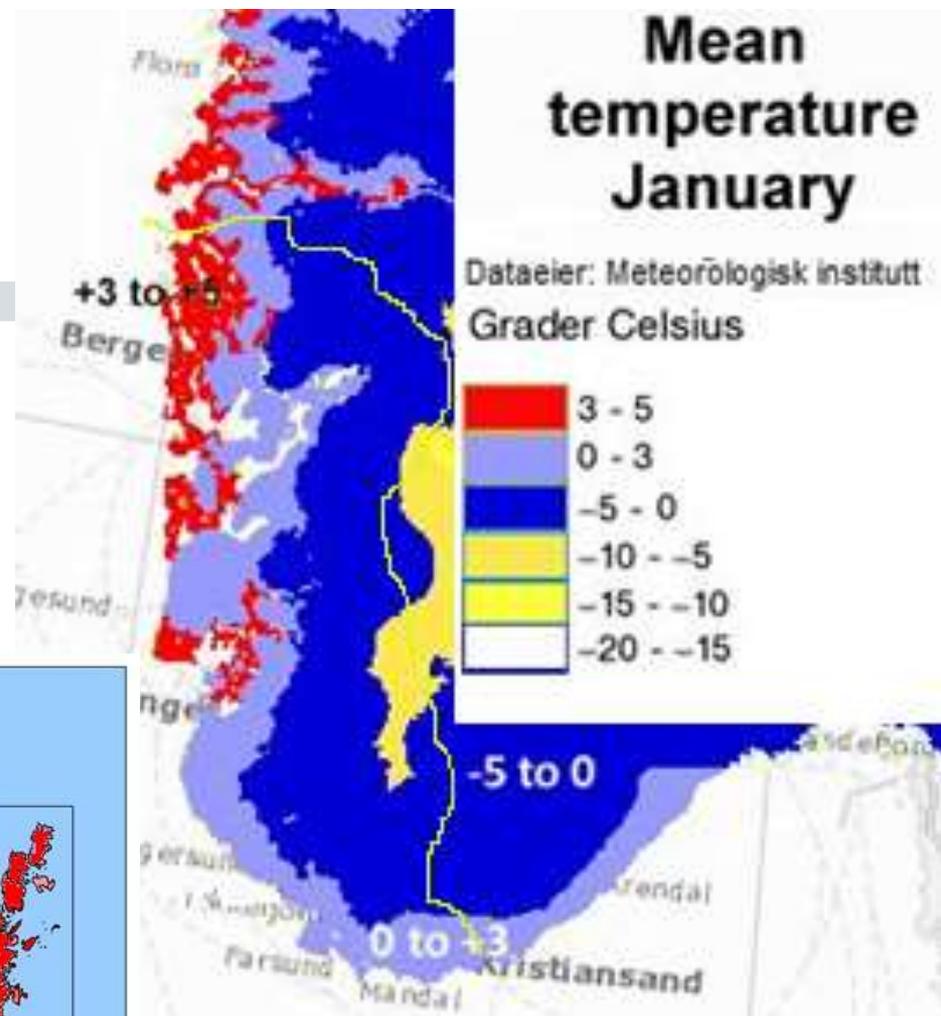
from met.no

Presented on seNorge.no

(maps to scale and in correct relative positions)

# Mean temperature January

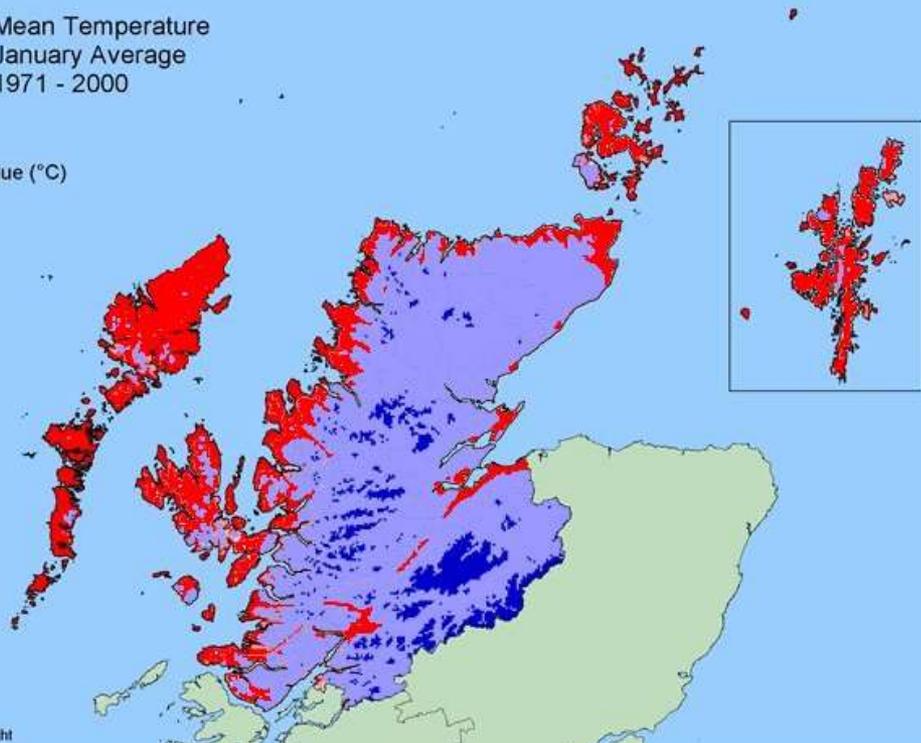
Dataer: Meteorologisk institutt  
Grader Celsius



Met Office  
Mean Temperature  
January Average  
1971 - 2000

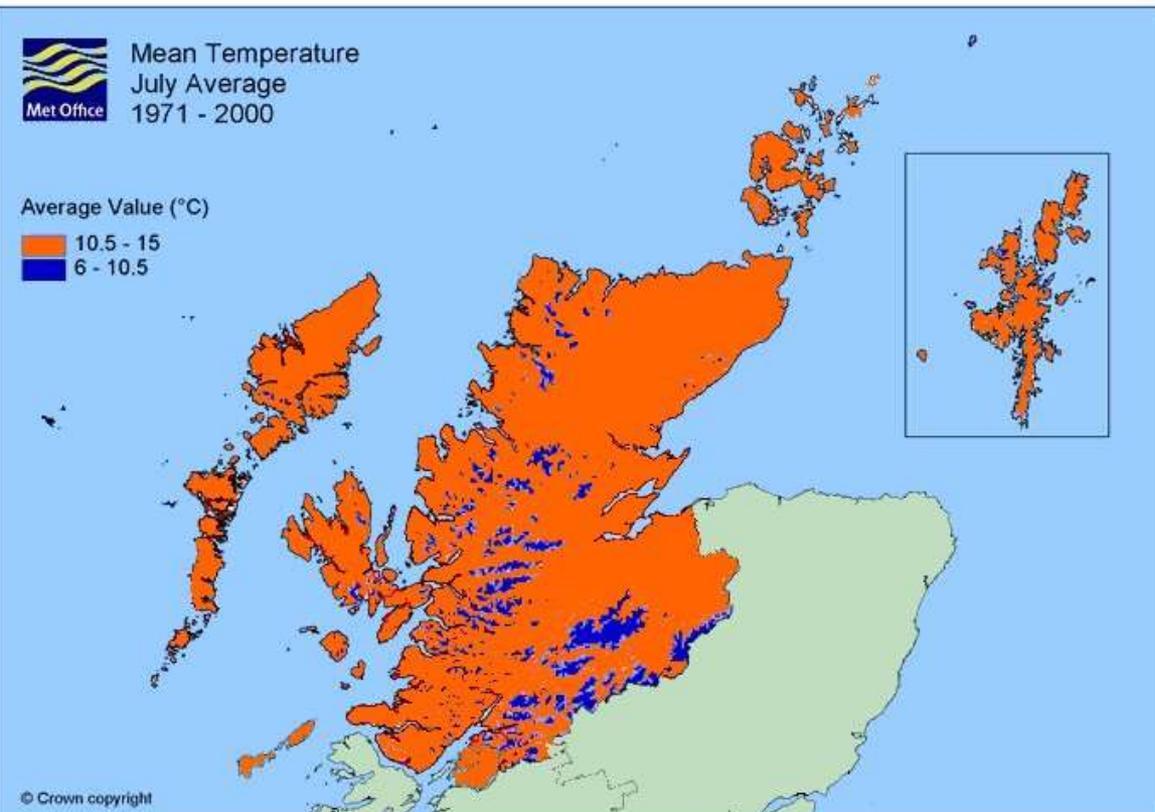
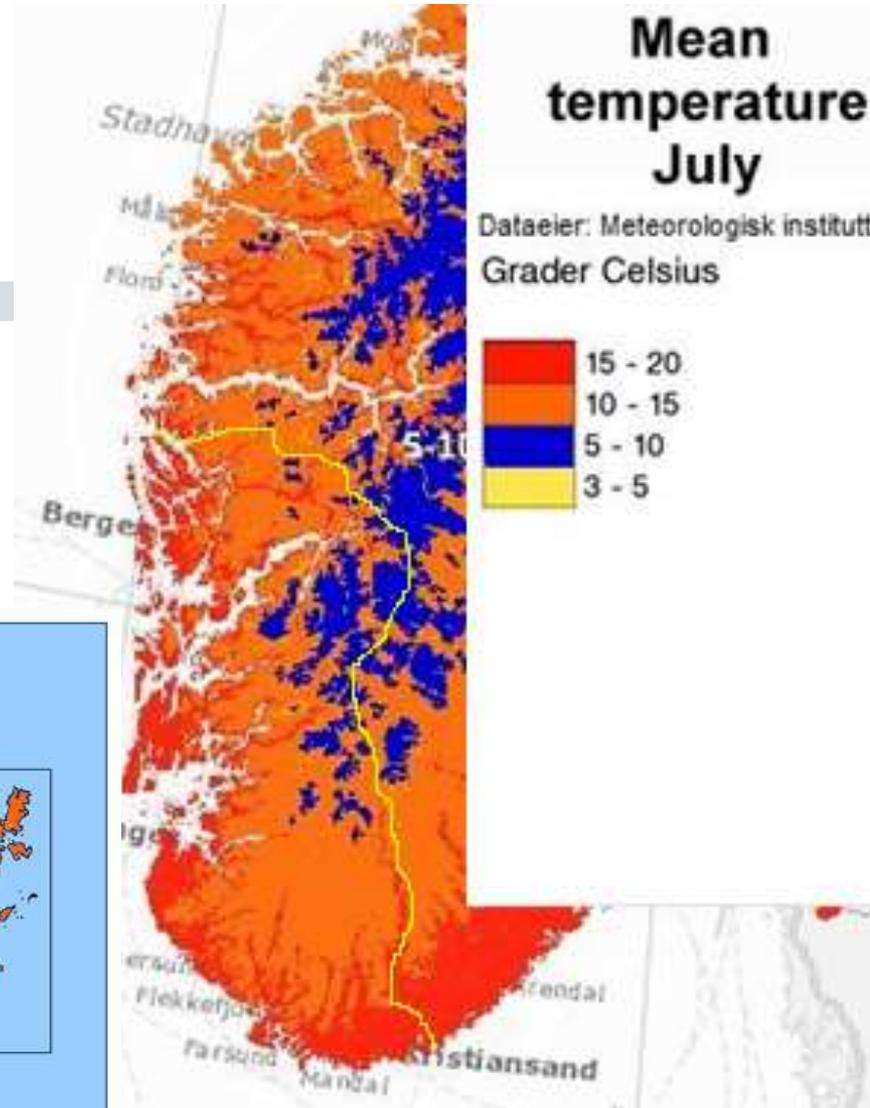
Average Value (°C)

- 4 - 7 (Red)
- 0 - 2 (Light Purple)
- 4 - 0 (Dark Blue)



# Mean temperature July

Dataaier: Meteorologisk institutt  
Grader Celsius

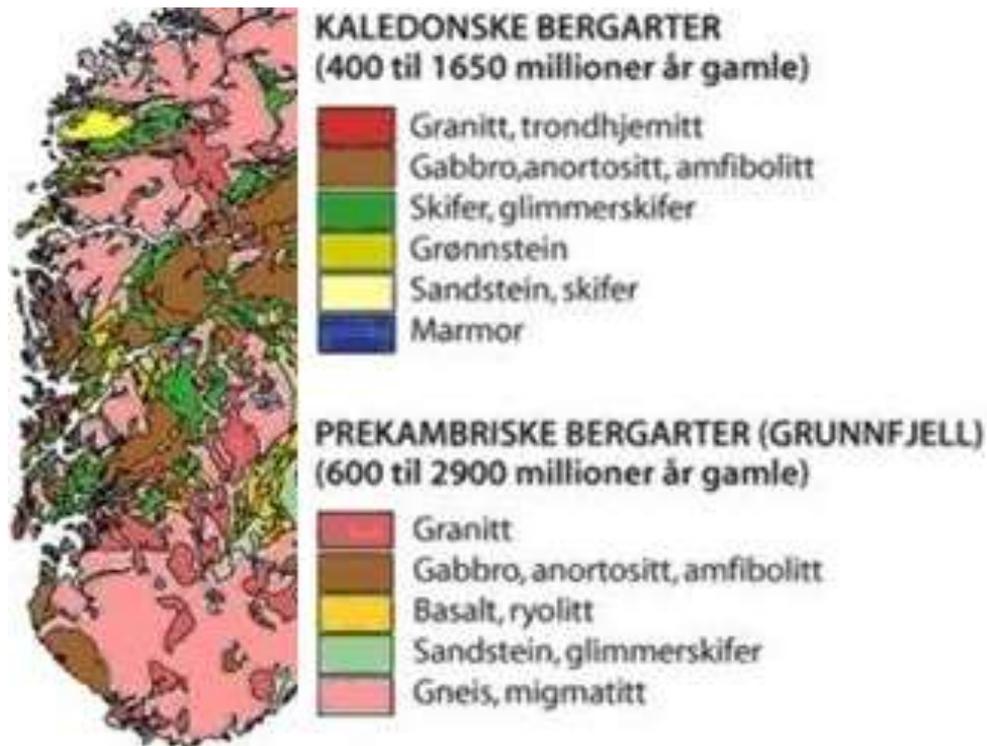




# Mean Annual Windspeeds

Sources : Meteorological Office  
Meterorologisk institutt

# Geology



Source: Norges geologiske undersøkelse

Jæren 1905



DSS 1996

Foto: Ielstrup, Henrik Jacob

Norsk Skogmuseum

Assynt c. 1910



N. Uist



Jæren

(both early 20th  
Century)



# Peat cutting in the mid 20th Century



Gairloch



West Highlands



West Norway



West Norway



Fiddjadalen 1927



Fiddjadalen 2007

<http://jarenfri.no/no/steder/friluftsgarden-man/>



# 1913



# 2004



Photos: Anders Beer  
Wilse (1913)  
& Oskar Puschmann  
(2004)

Fonnes, Hordaland 1971



Fonnes, Hordaland 2005



Grazing pressure reduced from 1975

Photos: Miljødirektoratet



5km

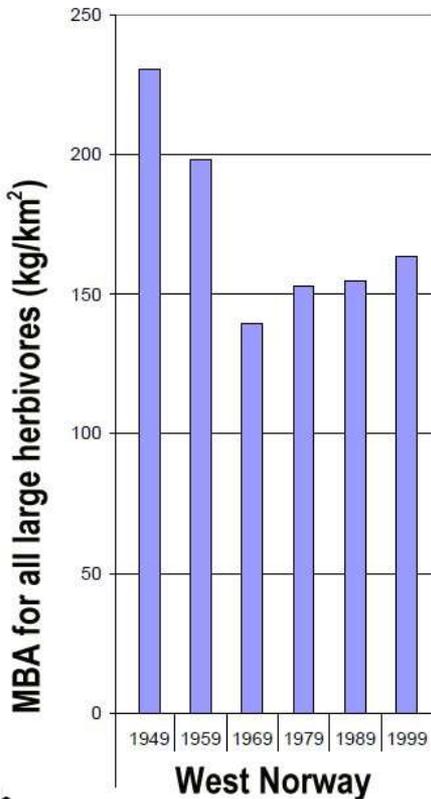
Rogaland/Vest Agder 58°25'N



Wester Ross 57°50'N

Images: Google Earth Compilation: duncan.halley@nina.no

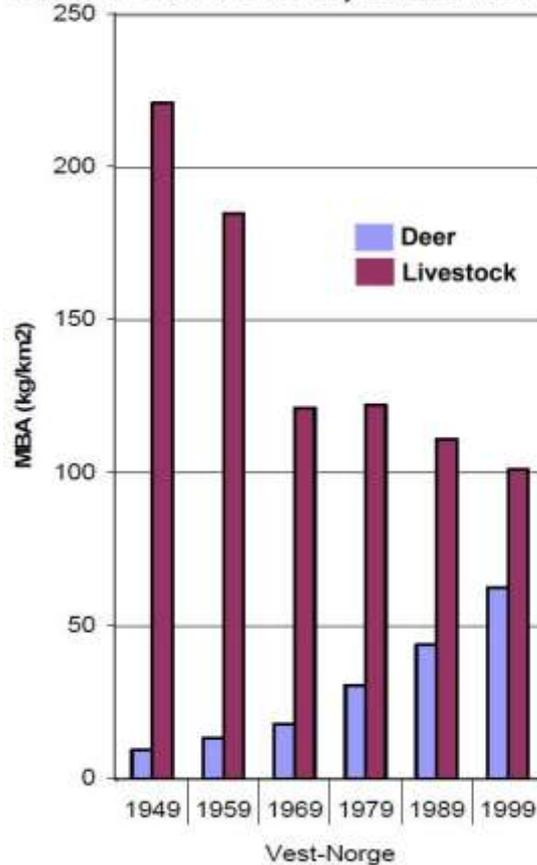
**Metabolic biomass per sq km  
all large herbivores\*  
West Norway 1949-1999**



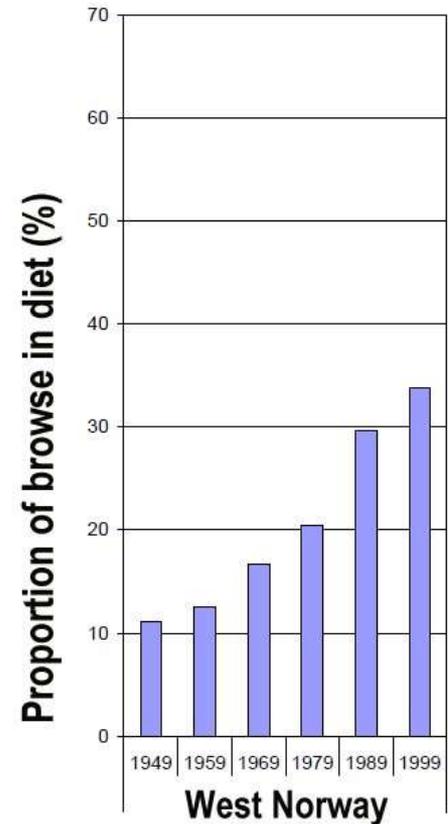
Source: Austrheim et al 2008

\*'Utmark' - ie rural areas excluding inbye fields but including woodland, rough grazing, etc.

**Metabolic biomass (kg/km<sup>2</sup>),  
livestock and deer, West Norway**



**Proportion of browse in diet  
all large herbivores,  
West Norway, 1949-1999**



Source: Austrheim et al 2008



Oslibakken



View from Oslibakken 1911

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# Rural Communities and Landbruk



View from Oslibakken today

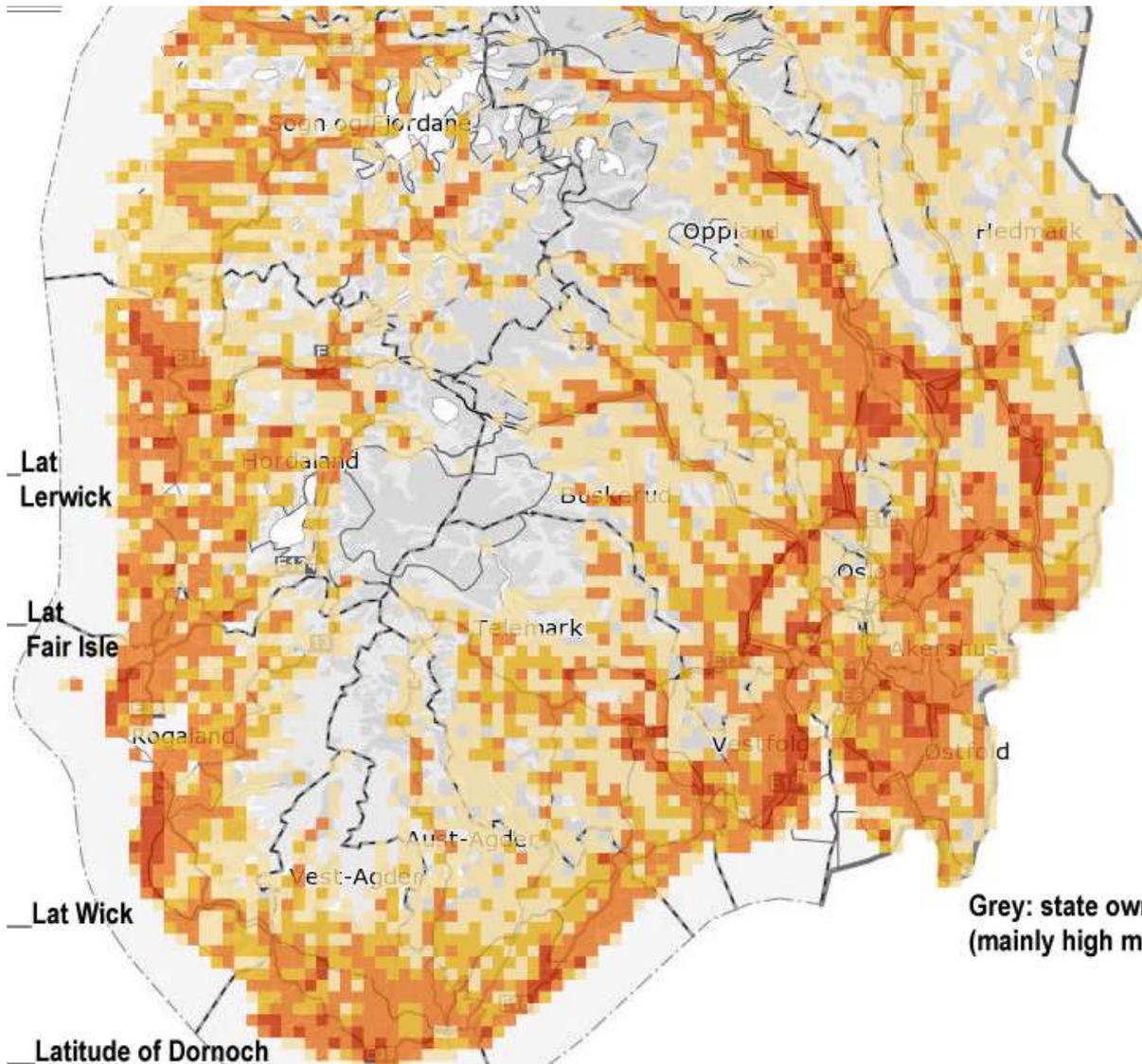
Photo: Erling Tøssebro

# Goals of Rural Community and Farming Policy: Norway

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- Safeguard the supply of sufficient, safe and varied high quality food at a reasonable price, including in times of war or crisis
- Preserve the distinctive features of Norway's settlement pattern (*and prevent 'push' migration to cities, with potential for the formation of a periurban underclass expensive in health, social security, and policing costs*)
- Protect and enhance the viability of rural communities
- Utilise the human and natural resources throughout the country in order to create the greatest possible national prosperity
- Guarantee farmers and food producers optimal working conditions
- Conserve land quality
- Conserve and enhance the environment and natural heritage
- Ensure equal living conditions
- Offer people the freedom to settle wherever they choose

[Norwegian Ministry of Agriculture and Food](#); [Ministry of Local Government](#)



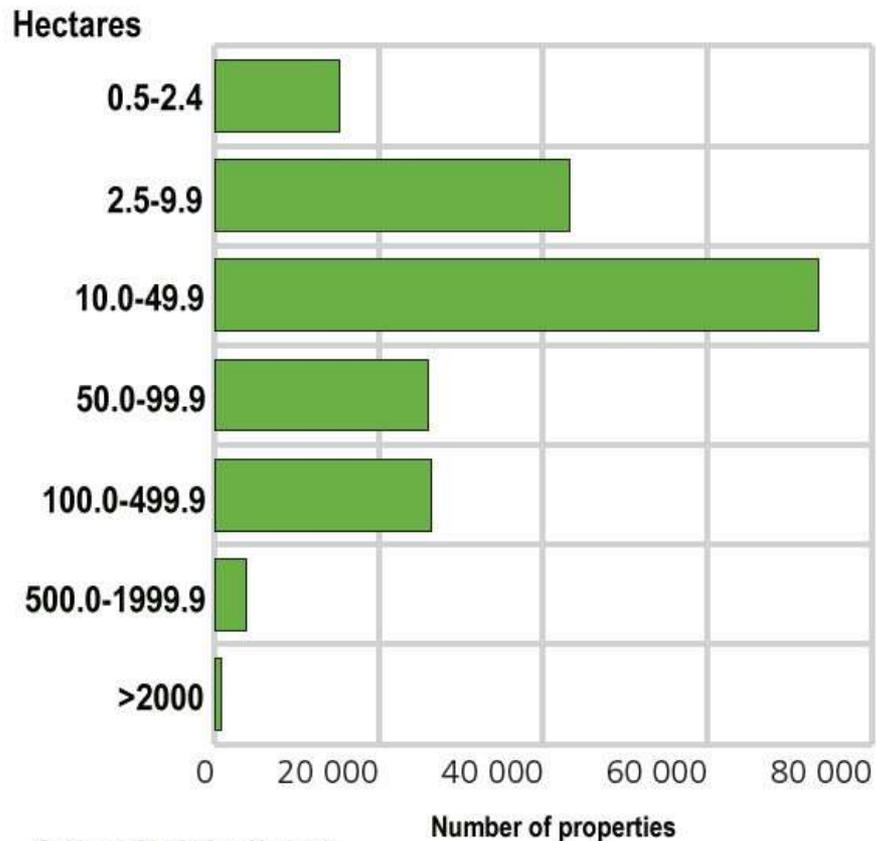
**'Land Use' (farming, forestry, hunting etc) properties per 5km grid square**

- 12 or fewer (<0.5/sq km)
- 13-25 (0.5-1/sq km)
- 26-75 (1-3/sq km)
- 76 or more (>3/sq km)

**Grey: state owned, state common lands ('Statsallmenning'), etc. (mainly high mountain plateaus above the natural treeline)**

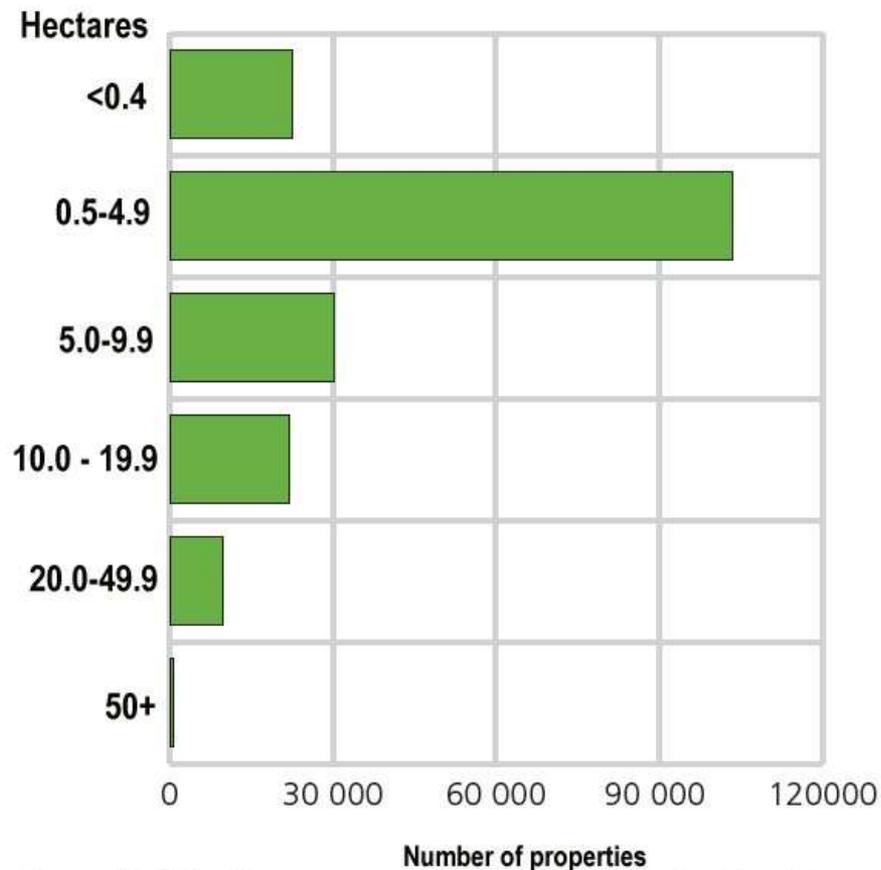
Source: Statistics Norway ([www.ssb.no](http://www.ssb.no))

## Land use properties (Landbrukseiendommer) by total area, 2010



Source: Statistics Norway

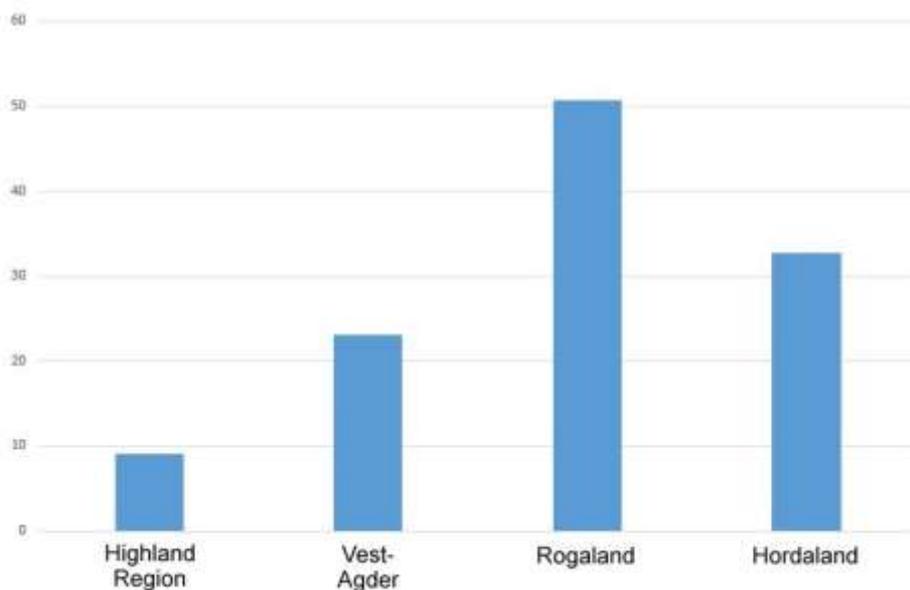
## Land use properties (Landbrukseiendommer) by area of farmland\*, 2010



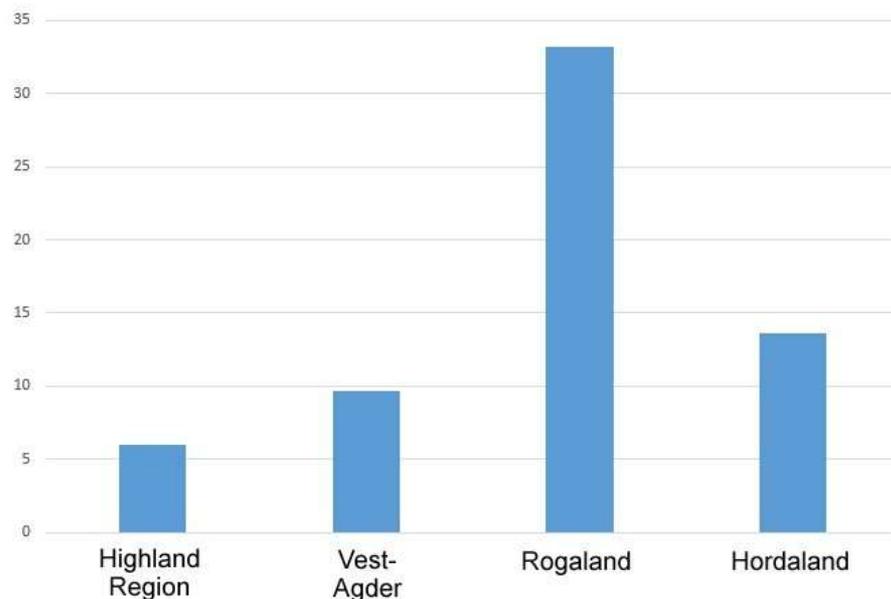
Source: Statistics Norway

\* arable and inbye grazings

# Population densities, Highland Region and SW Norwegian provinces



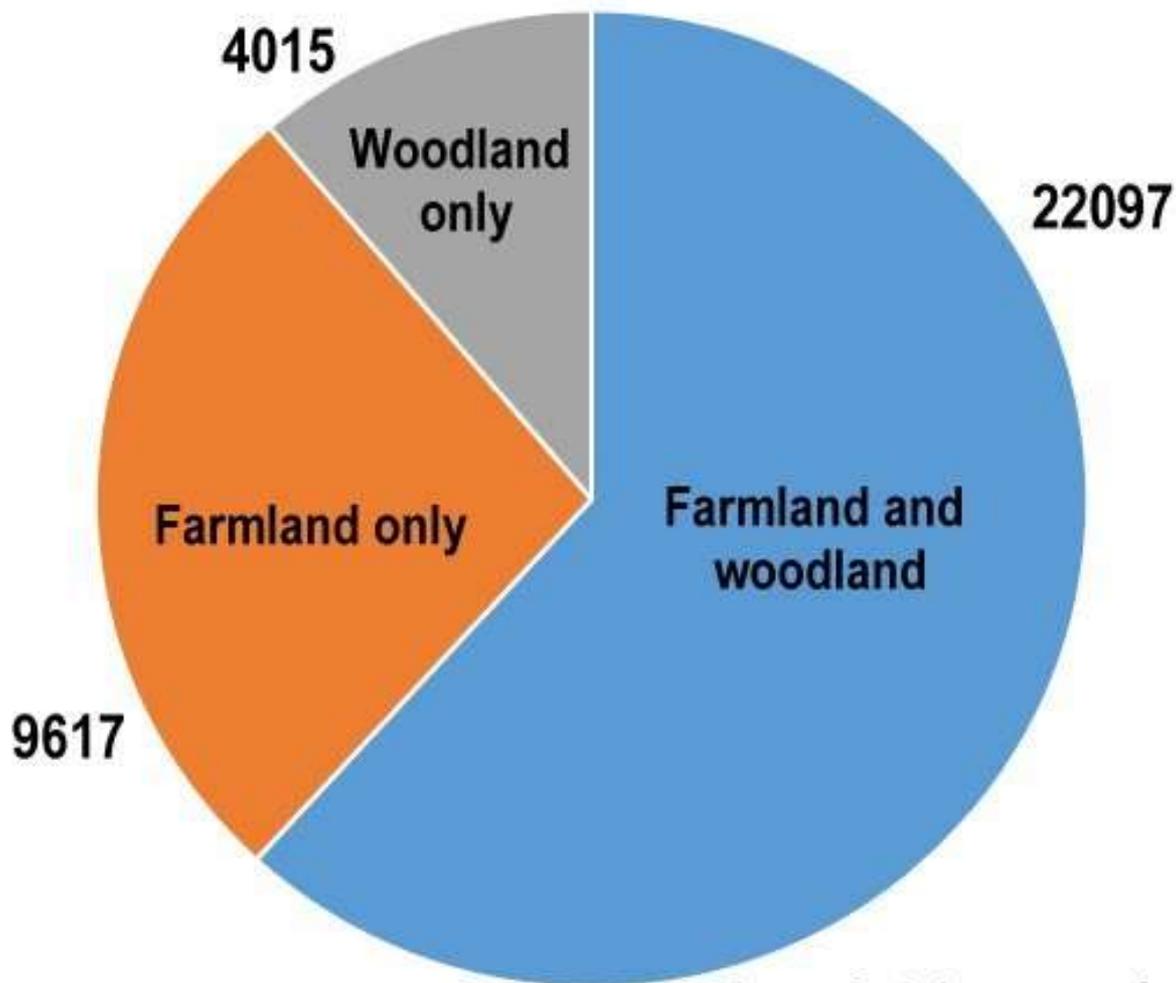
Including main cities (Inverness, Stavanger, Bergen, Kristiansand)



Excluding main cities (Inverness, Stavanger, Bergen, Kristiansand)

The two areas have very similar climates, geologies, and landforms; see <http://tinyurl.com/zfvwbnh>

# Land use properties with different combinations of farmland and woodland, SW Norway (Vest Agder, Rogaland, Hordaland), 2010



Source: Statistisk sentralbyrå



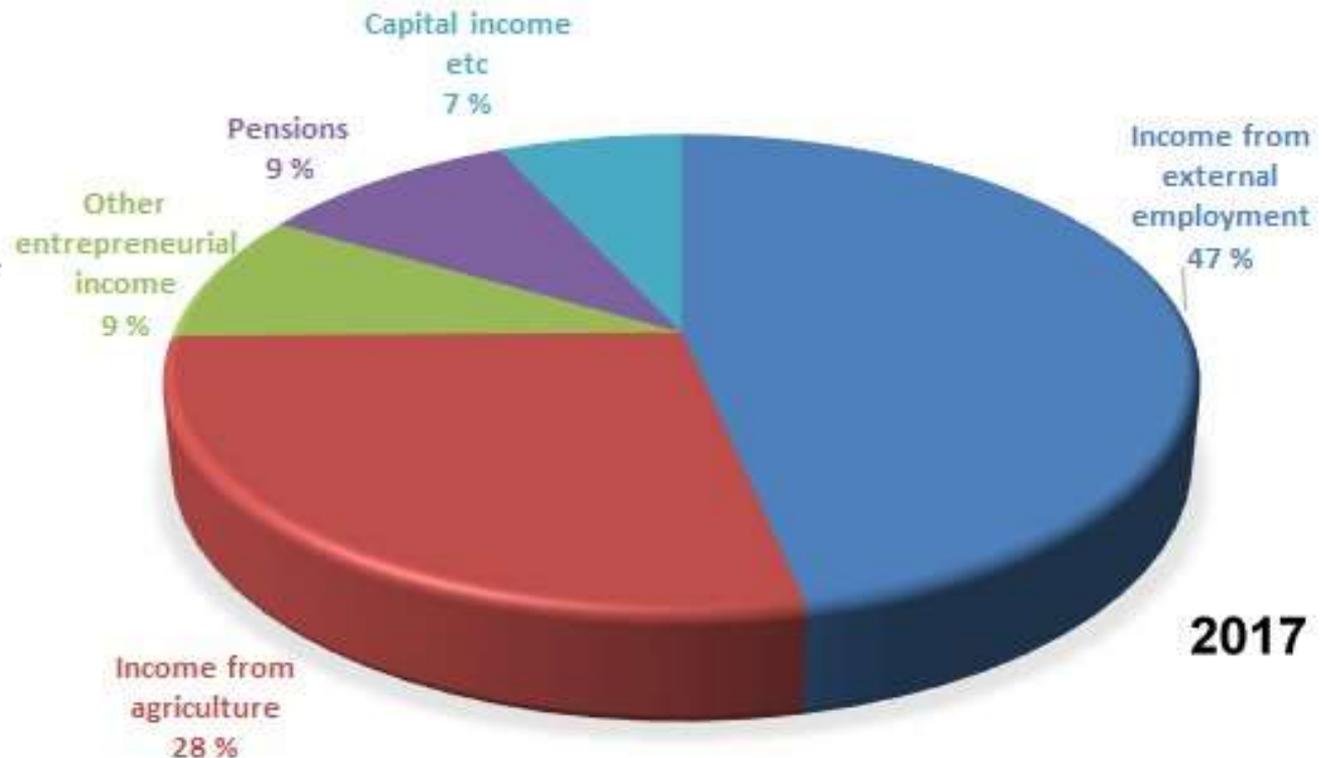
# Landbruk unit titular owner: income by source, West Norway



Photo: <http://www.landbruk.no/>

6.4% of the population of SW Norway are resident on Landbruk properties.

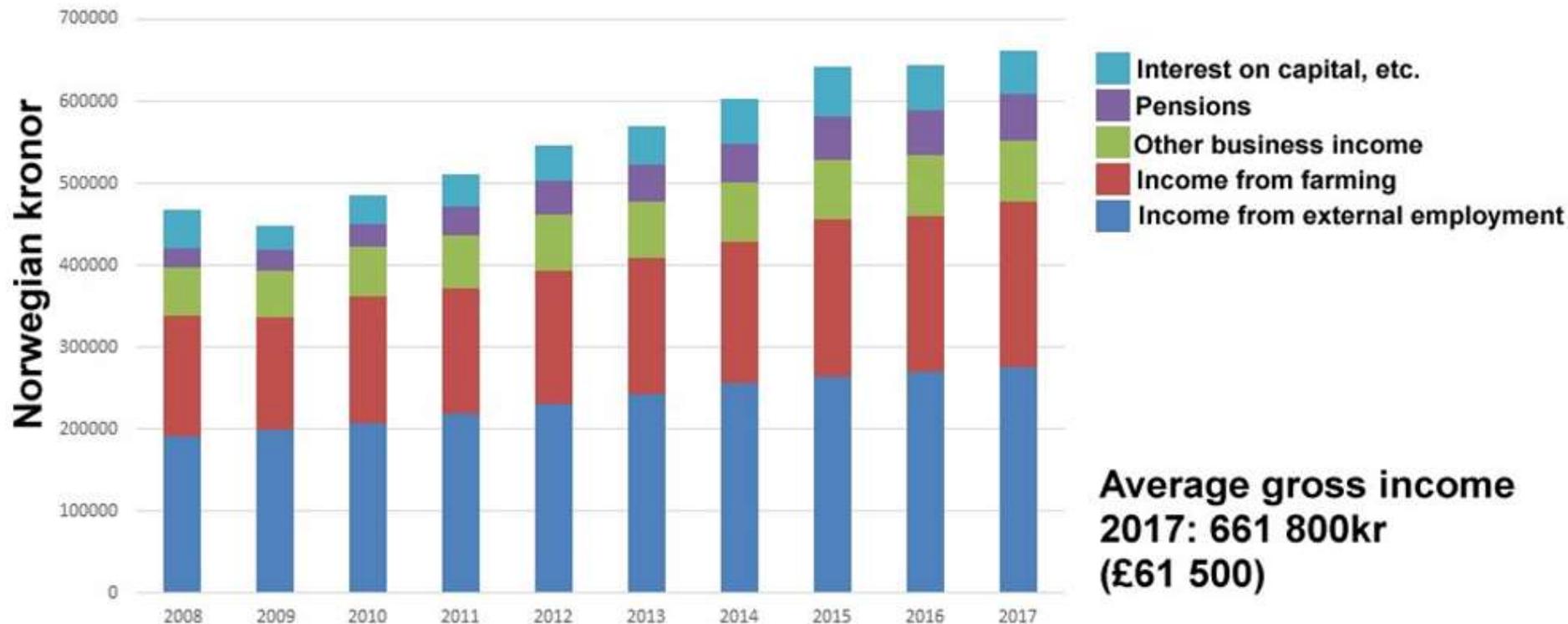
While ownership is individual, properties are typically worked by families.



Average annual income, all sources: 618667kr (c. £55 000)

Source: Statistics Norway

# Landbruk unit owner: income by source, West Norway



**Increase in period: 41%**

**Increase in farming & other business income: 62%**

Mean gross incomes : Crofters £29,000 (Source: '[Economic conditions of crofting 2015-18: survey](#)') 'Scotland: Farm workers', 2013: £16098; 'Scotland: Agricultural and related trades', 2013: £19505; 2015 'Scotland: Farmers': £31461.

Source: [www.ons.gov.uk](http://www.ons.gov.uk) ;



# Summary - landuse

- Norway's land use system is very differently structured to Scotland's
- It has a highly dispersed ownership pattern, mainly in small-medium owner-occupied units. They exploit the land in a diverse manner – farming, forestry, hunting, cabins are all major income streams. External employment is a usual part of the mix.
- Agricultural payments cost £1.14 billion in 2015, 1.2% of government spending (less than half of the £2.5 billion overseas aid budget).
- Scottish annualised CAP payments projections 2015-20: £1.1billion/year\*.
- Norwegian external tariffs on agricultural products are much higher than the EU's.
- Almost all the money flowed to and through landusers resident in rural communities. They are 3% of the total population; very much more in rural areas.
- This underpins the whole rural community – the shops, schools, social institutions
- The system enjoys relatively broad social consensus.

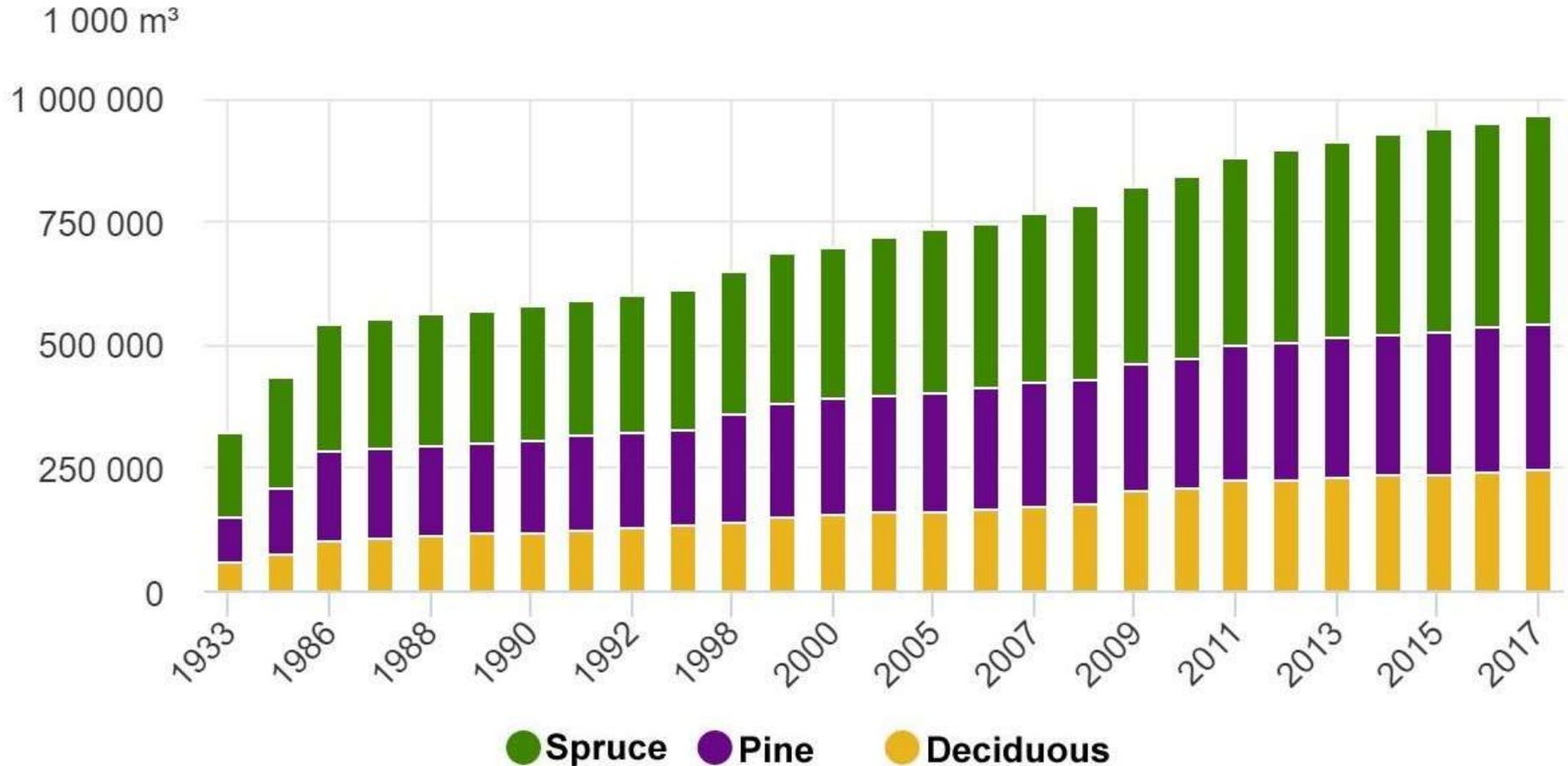
\*Source: [Scottish Govt](#)

# Woodland expansion: area



- **The total area of forest classified as ‘productive’ increased in SW Norway by 55% 1963-93** (Source: [Norwegian Forest & Landscape Institute](#)).
- ‘Productive’ is a forestry statistics term. It means potential increase in harvestable timber volume of  $>1\text{m}^3/\text{ha}/\text{year}$ , whether or not harvested for timber.
- **Between forest inventory periods 2005-09 and 2010-14 the annualised increase in area of woodland in West Norway was 305 sq. km/year, or 2.6% of the land area over 5 years.** (Data: Statistisk sentralbyrå)
- Almost all of the expansion in area in the period 2005-2014 has been through natural regeneration.
- [Scottish Forestry Strategy](#) (2006) for increased forest area: 17% to 25% of land cover (+8% increase) by 2030; [1000 km<sup>2</sup> increase by 2022](#).

# Standing cubic mass of timber (under bark), Norway



Kilde: Norsk institutt for bioøkonomi. Statistisk sentralbyrå, Landsskogtakseringen.

Index values over period(1933=100): spruce 242; pine 329; deciduous 296; overall 299  
Spruce & pine increases mainly natural regeneration, partly planting. Deciduous almost entirely natural regeneration.

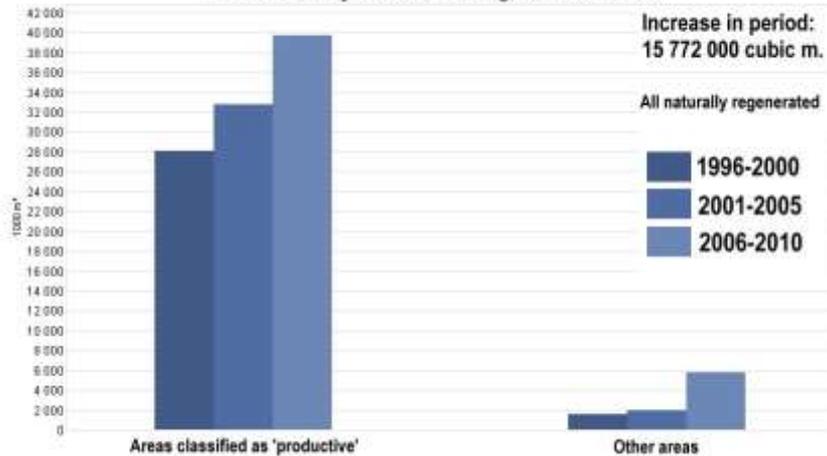
# Seedling planting (hectares), West Norway, 1971-2017



- Planting (of conifers) was relatively common in the period of woodland restoration
- Natural regeneration now dominates, even in pure commercial forestry stands
- Farmer-owned woodland is now almost all regenerated naturally
- The Norwegian Forest Law of 2010 requires all owners to ensure adequate regeneration of woodland following any harvest.
- Deer fencing is never used (except on deer farms and along a few busy periurban roads).

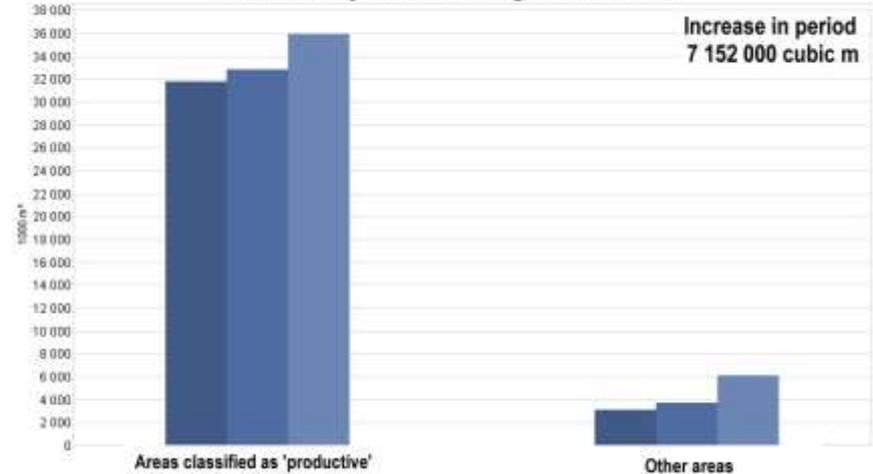
# Woodland expansion: standing mass of timber and carbon sequestration in West Norway

Standing cubic mass deciduous timber (1000 m3)  
West Norway statistical region 1996-2010



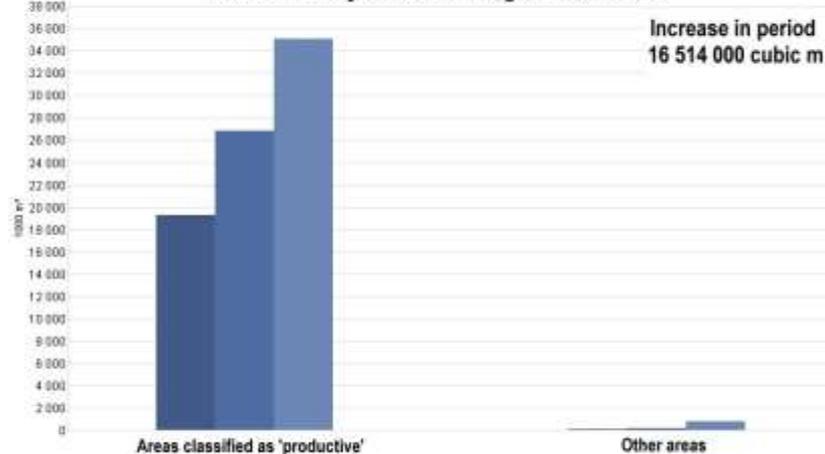
Kilde: Statistisk sentralbyrå

Standing cubic mass pine timber (1000m3)  
West Norway statistical region 1996-2010



Kilde: Statistisk sentralbyrå

Standing cubic mass spruce timber (1000 m3)  
West Norway statistical region 1996-2010



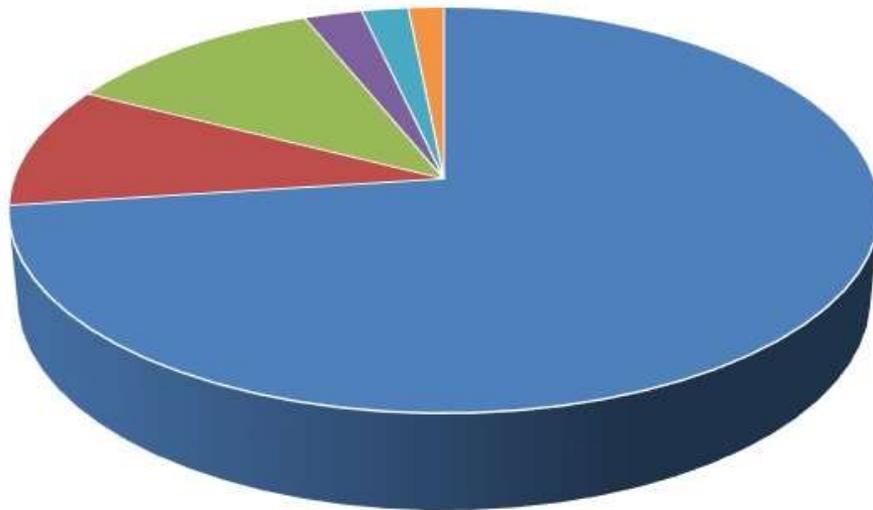
Kilde: Statistisk sentralbyrå

- Annualised increase in standing timber volume 1996-2010: **3 943 800 cubic metres / year**
- Using volume increase ratio 1996-2010 spruce:pine:deciduous (mainly birch) and UK [Forestry Commission conversion factors](#) this represents an **annual sequestration of 0.99 million tonnes of carbon**
- Notional value, [EU CO<sup>2</sup> emissions auction price](#) 30.04.2019 (€26.19/tonne CO<sup>2</sup>\*): €95.1 million/year (£81.7 million)
- Does not include bark, branches, leaves, root system, or soil carbon.
- [Scottish Forest Strategy sequestration target](#): sequester 1.0MtC annually by 2020 through woodland expansion.

\*One tonne of carbon equals 3.67 tonnes of carbon dioxide.



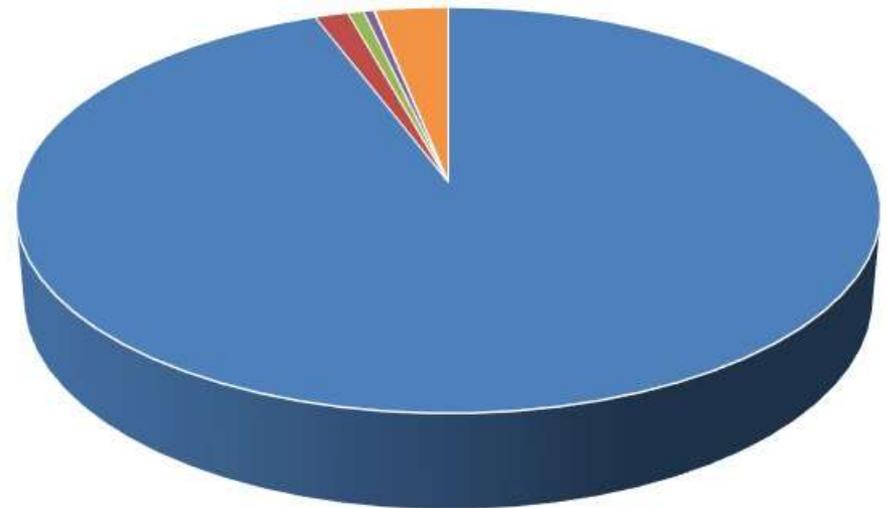
Forest ownership by area



- Individual owners 73%
- Forestry companies etc. 10%
- State 11%
- Local government 2.5%
- Local forest commons 2%
- Other 1.5%

All Norway  
Source: Statistics Norway

Forest ownership by number of properties



- Individual owners 94%
- Forestry companies etc. 1%
- State 1%
- Local government 0.5%
- Local forest commons 0.5%
- Other 3%

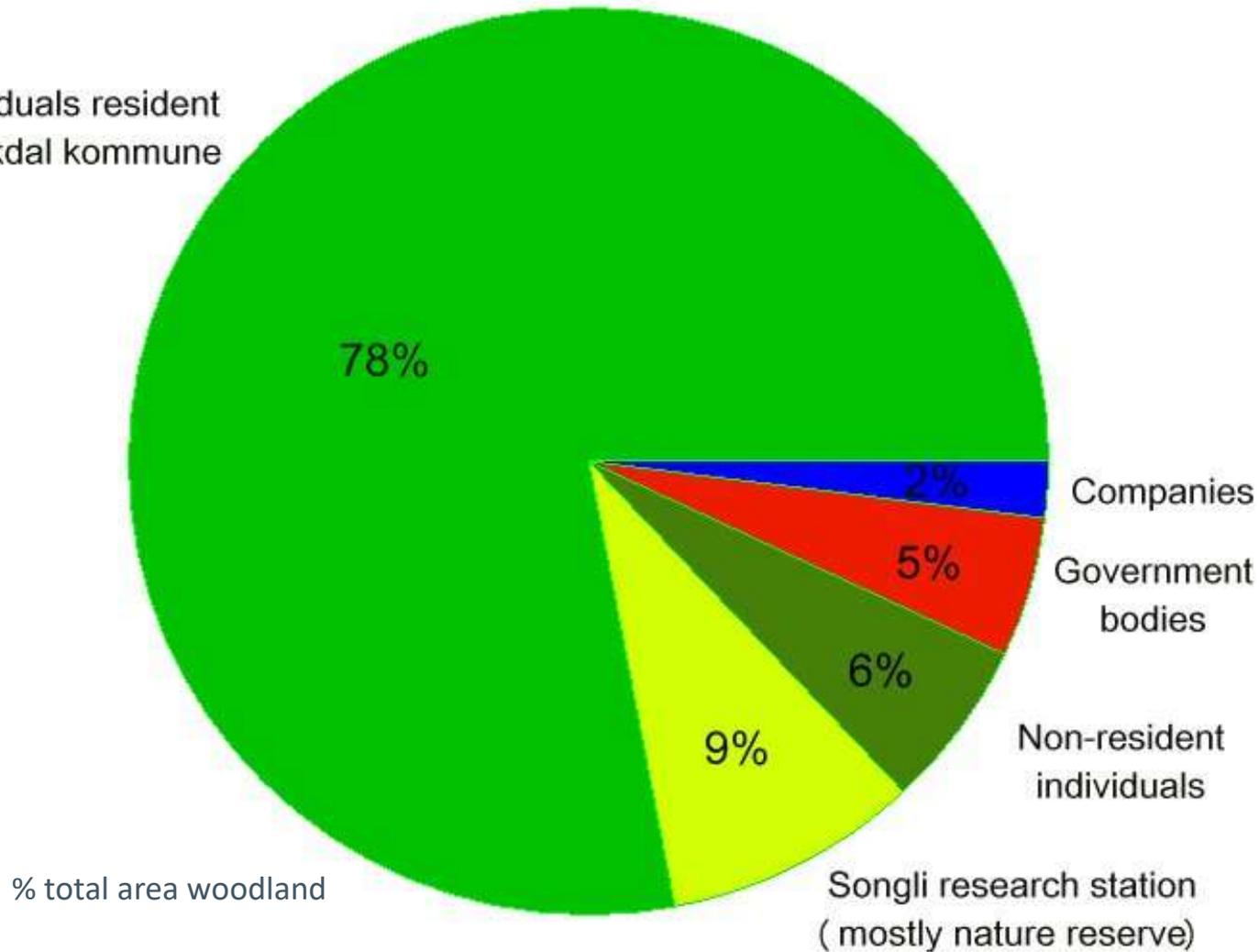
Most forestry is owned by and integrated with owner-occupied 'land use' (farming) units for fuelwood harvesting, hunting, grazing, cabin rentals, etc.

Harvest and sales of timber are mainly organised through owner's cooperatives.

## Ownership of forestry in Norway

# Forest ownership in Orkdal kommune, Norway

Individuals resident  
in Orkdal kommune



Orkdal is a typical 'glen kommune', in Trøndelag; fields mainly in the strath, woodland on the hills .

# Forestry cooperatives

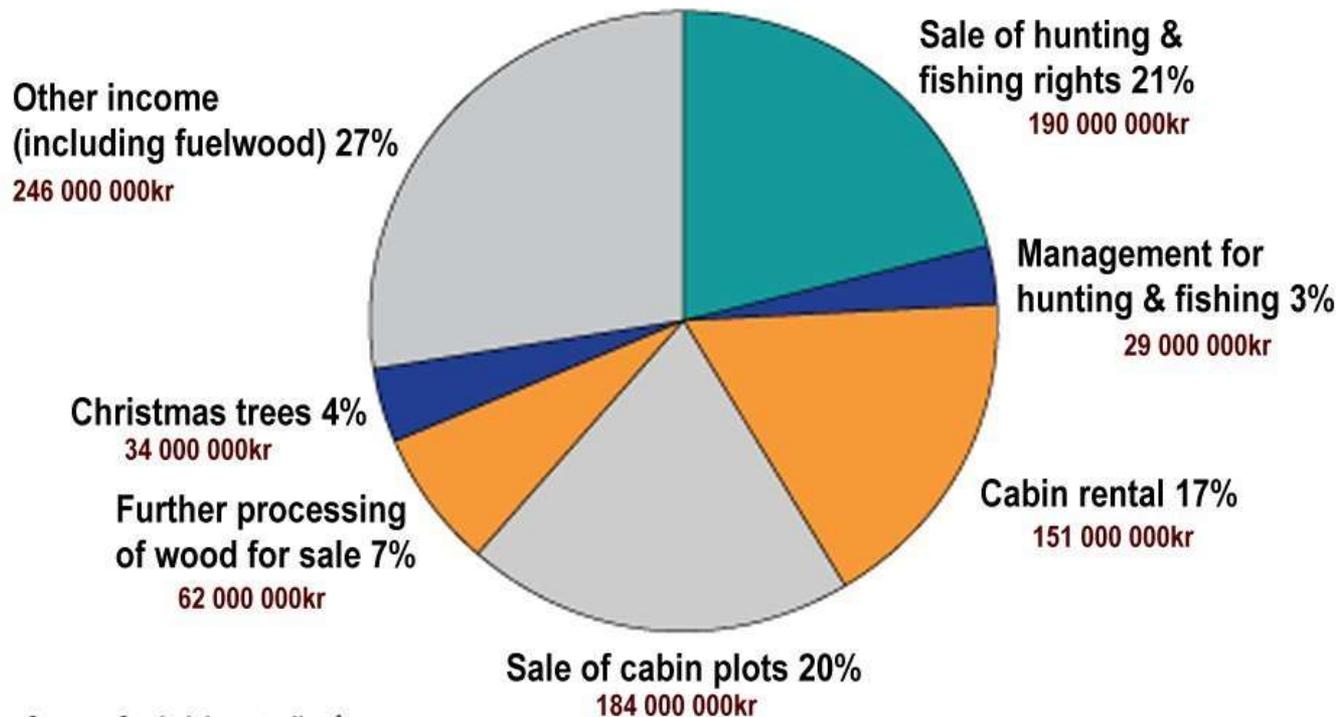
<https://www.skog.no/om-oss/about-us-english-version/>



- Most woodland/farming properties in Norway join regionally-based forestry cooperatives
- These have 36 000 family owners and an 80% share of the Norwegian timber market
- They do the bulk of timber management, harvesting and sales
- This allows for investment in modern machinery and other economies of scale
- Woodland is exploited for other purposes (hunting, grazing, cabins, recreational sales, etc.) by the owners individually



# Non-timber sources of income from woodland, Norway, 2007



Source: Statistisk sentralbyrå

Total: 896 000 000kr (€110 000 000; £74 000 000; 2007 exchange rates)

Data for all Norway.

Does **not** include grazing of domestic stock.

# How 'landbrukers' create value from woodlands in SW Norway

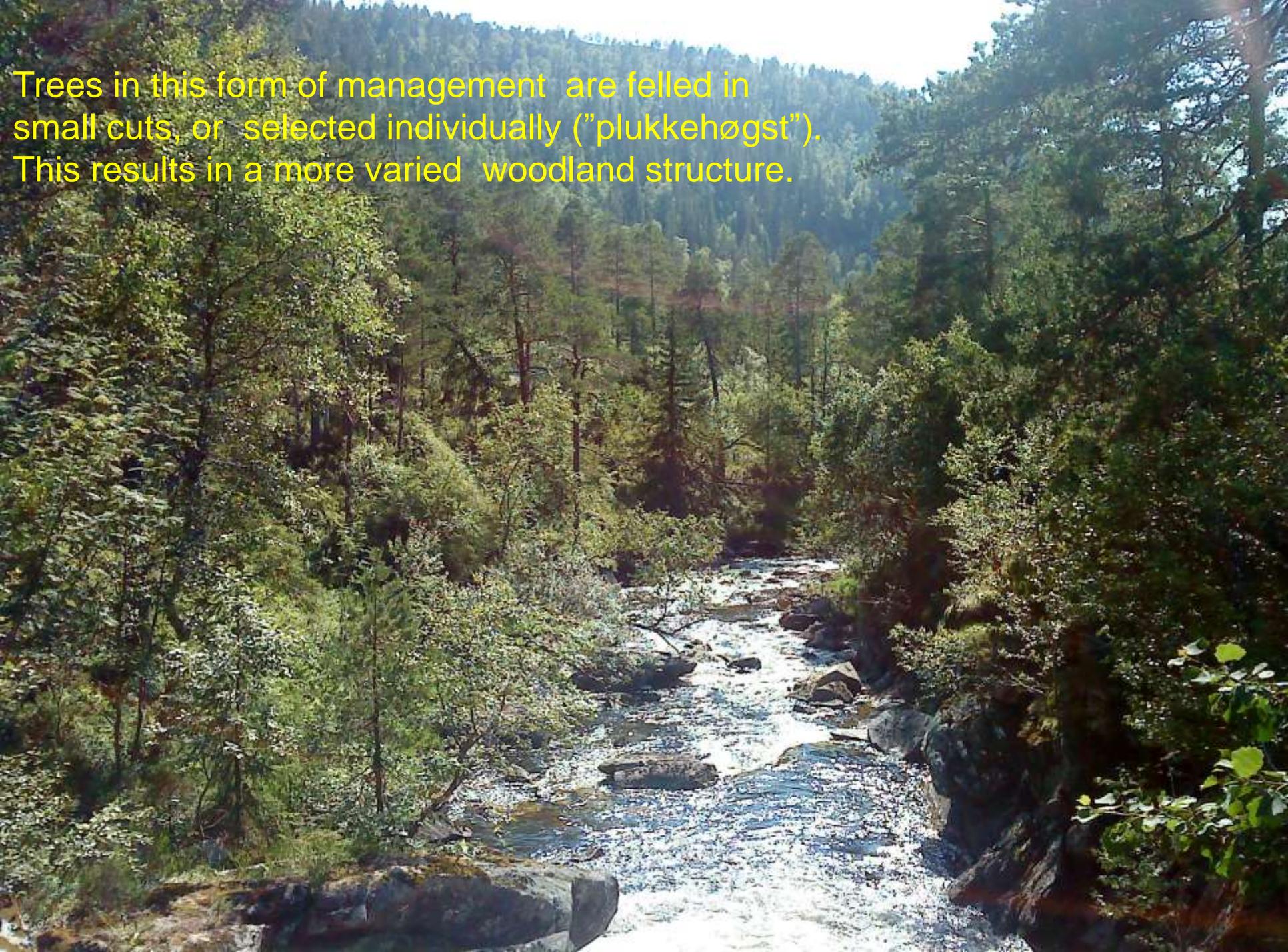
Some woodland is in clear-fell rotation for timber (as *primary* income source)



A high-angle photograph of a dense, multi-colored forest covering a hillside. The trees vary in shade from vibrant green to dark green, suggesting a mix of species. In the upper left corner, a small village with red-roofed houses and a winding road is visible. A utility pole with power lines is situated in the middle ground. The foreground shows some rocky terrain with moss and small plants.

More is in mixed-use for timber, firewood, grazing, hunting, and forest products

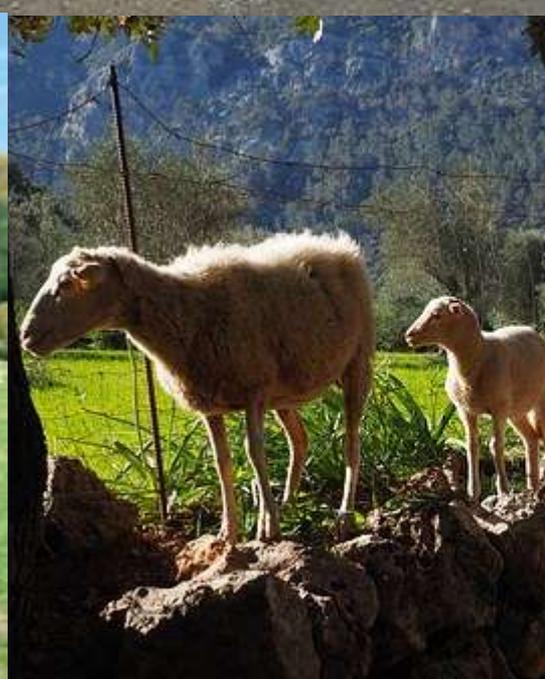
Trees in this form of management are felled in small cuts, or selected individually ("plukkehogst"). This results in a more varied woodland structure.



# Grazing



Holtålen, Trøndelag (875m asl)





Hunnedalen, Rogaland (661m asl)



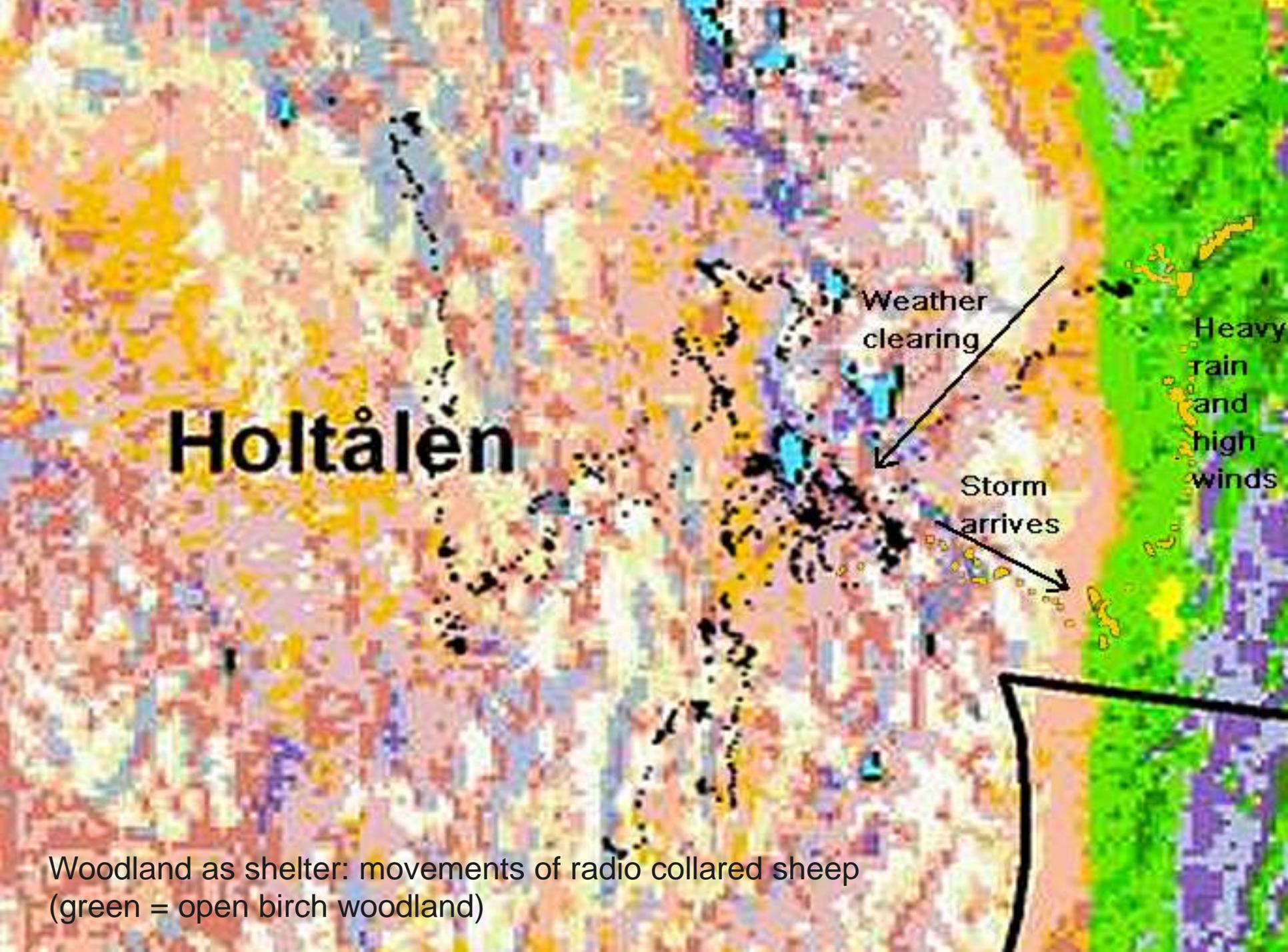
# Holtålen

Weather clearing

Storm arrives

Heavy rain and high winds

Woodland as shelter: movements of radio collared sheep (green = open birch woodland)





Effects of mutual shelter: wind-bent 'granny pines' scattered among straight young-adult pines, naturally regenerated since the 1930s following reduction in grazing pressures. (Songli, coastal Trøndelag, 300m asl).





Stavanger  
Sandnes  
Bryne  
Egersund  
Lynes  
Farsund

SETESD

**Gården Li, Hidrasundet >**

# Fuelwood





2009 household fuelwood  
consumption: 1 600 000 tonnes  
or 816kg per household\*

2008 declared income from fuelwood  
sales: 323 million kroner (£37 million)\*

\*Source: Statistisk sentralbyrå

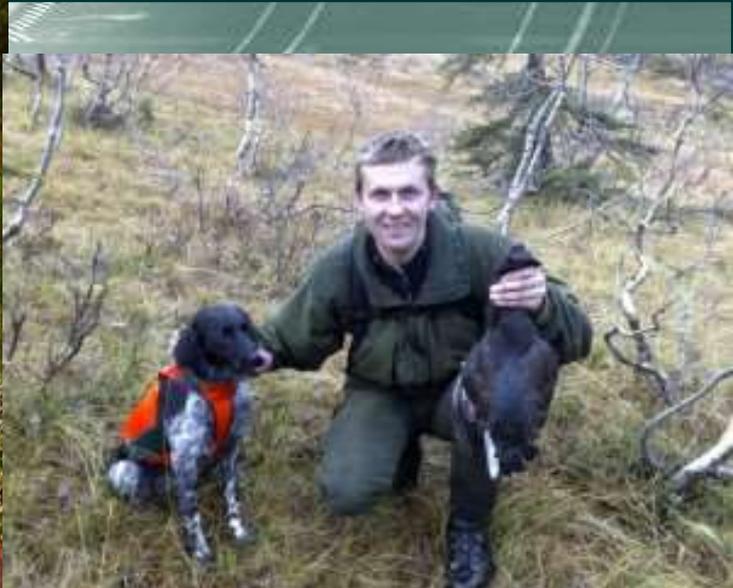


# Hunting



<https://www.environment.no/topics/outdoor-recreation/hunting>









Deer hunting: «Reading» the terrain and wind conditions

[Summary of the Norwegian deer management system](#)





Stalking in open woodland

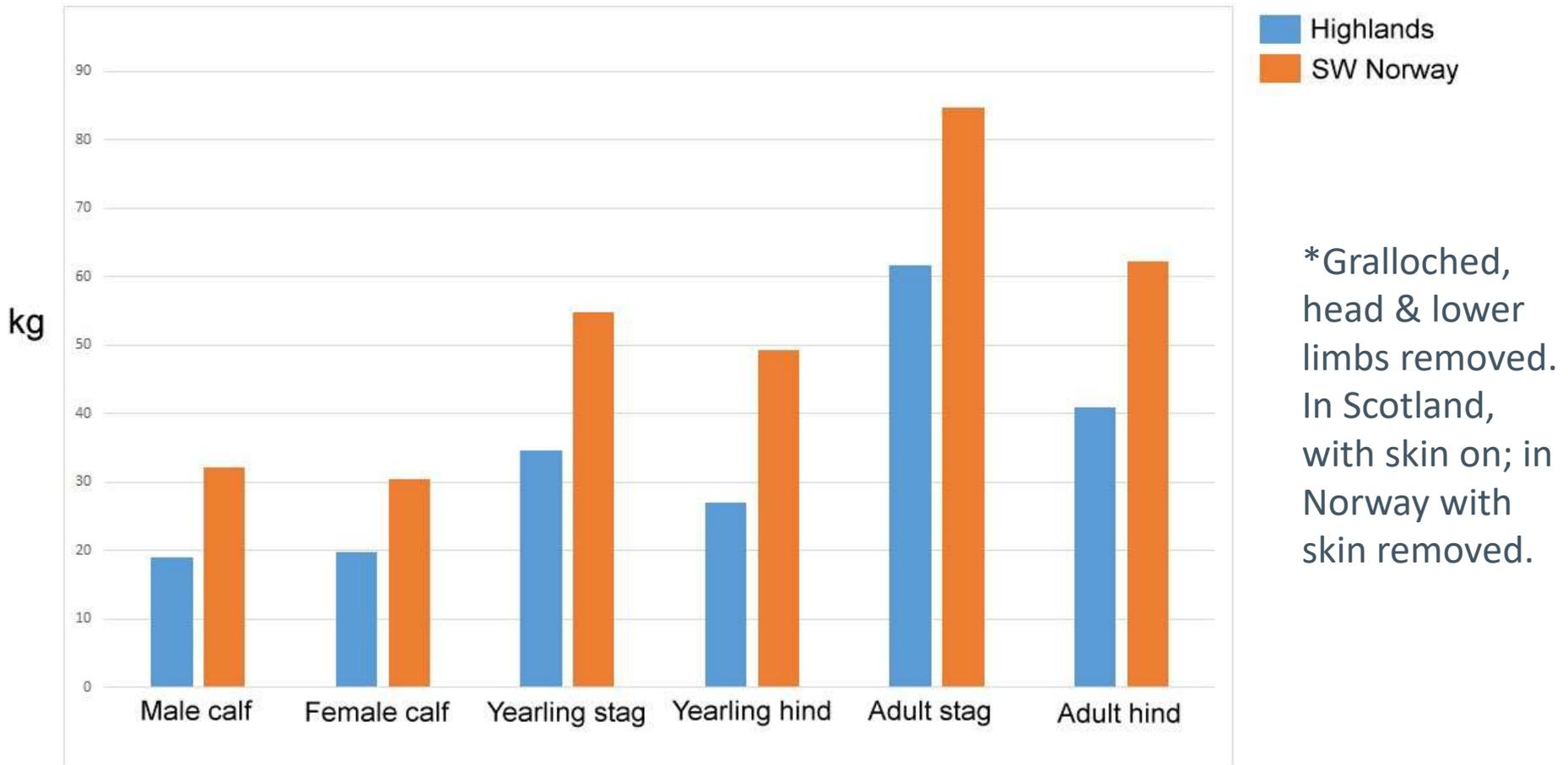
Stag is about 3 years old



A successful stalk: a good average adult stag, c. 85kg dressed carcass weight



## Dressed carcass weights of red deer \*

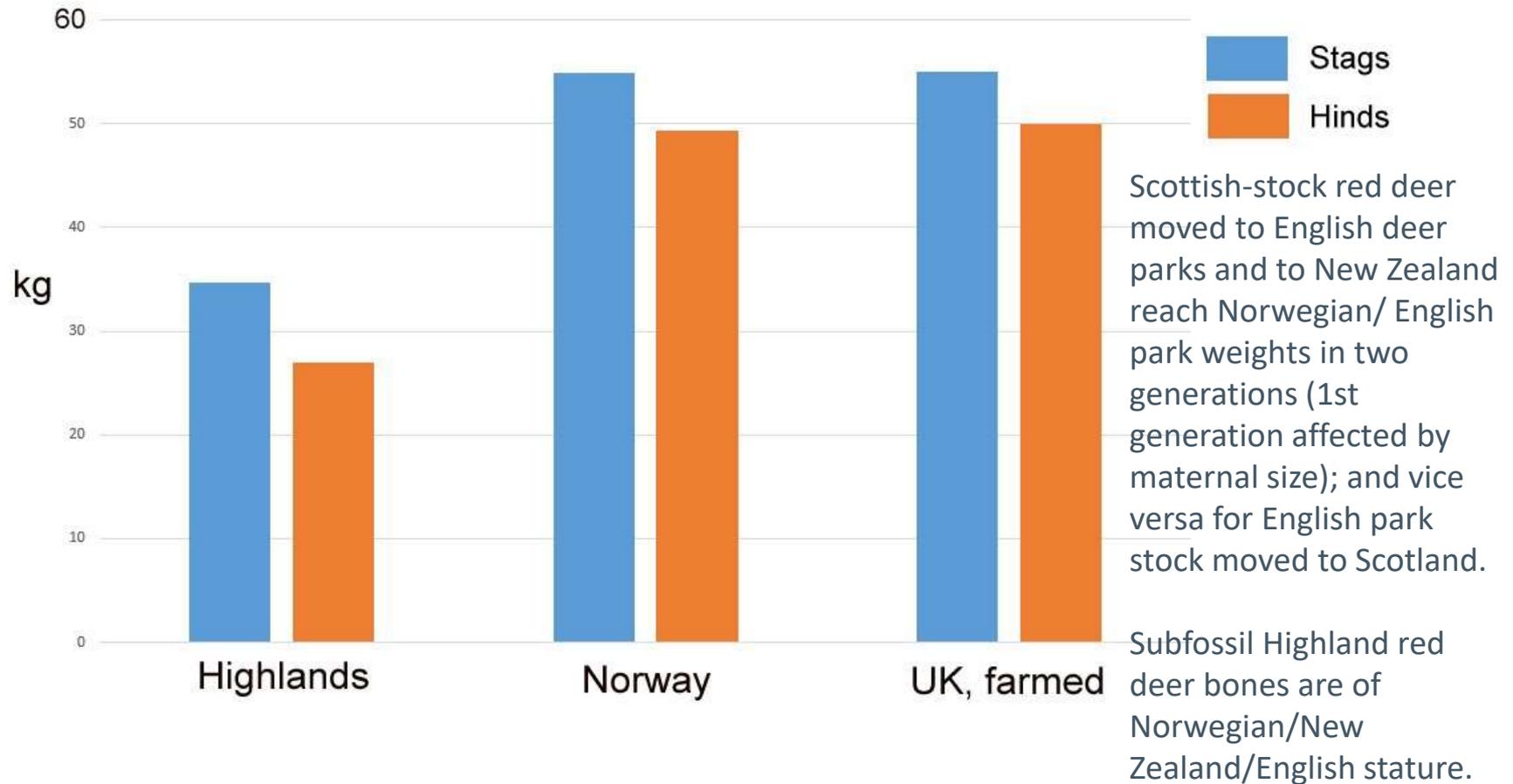


\*Gralloched, head & lower limbs removed. In Scotland, with skin on; in Norway with skin removed.

Data: Highlands James Hutton Institute; Norway: [www.hjortevilt.no](http://www.hjortevilt.no)

\*Weight of 1 ½ year old Scottish hind hide, 2015: 5kg  
2 ½+ hind: 6kg. Source: Deer Consultancy Services

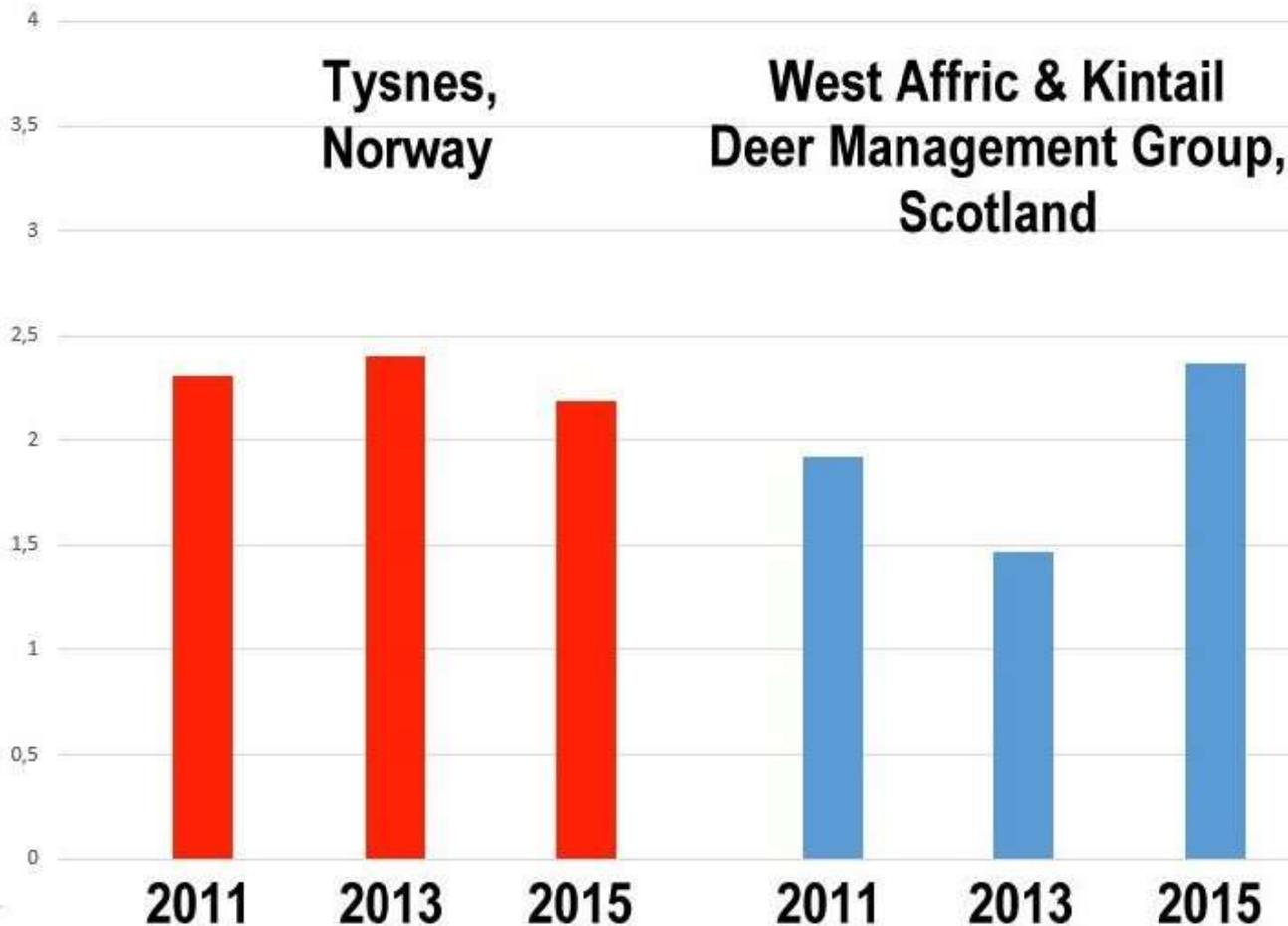
## Dressed Carcass Weights of 1 1/2 year old red deer



Data: Highlands James Hutton Institute; Norway: [www.hjortevilt.no](http://www.hjortevilt.no); UK farmed University of Bangor

(Yearlings are the best indicators of relative population condition.  
UK farmed animals are of UK, and mainly Scottish, genetic origin)

# Red deer harvested/sq. km.



NB Tysnes red deer > 30% larger than W.Affric/Kintail red deer

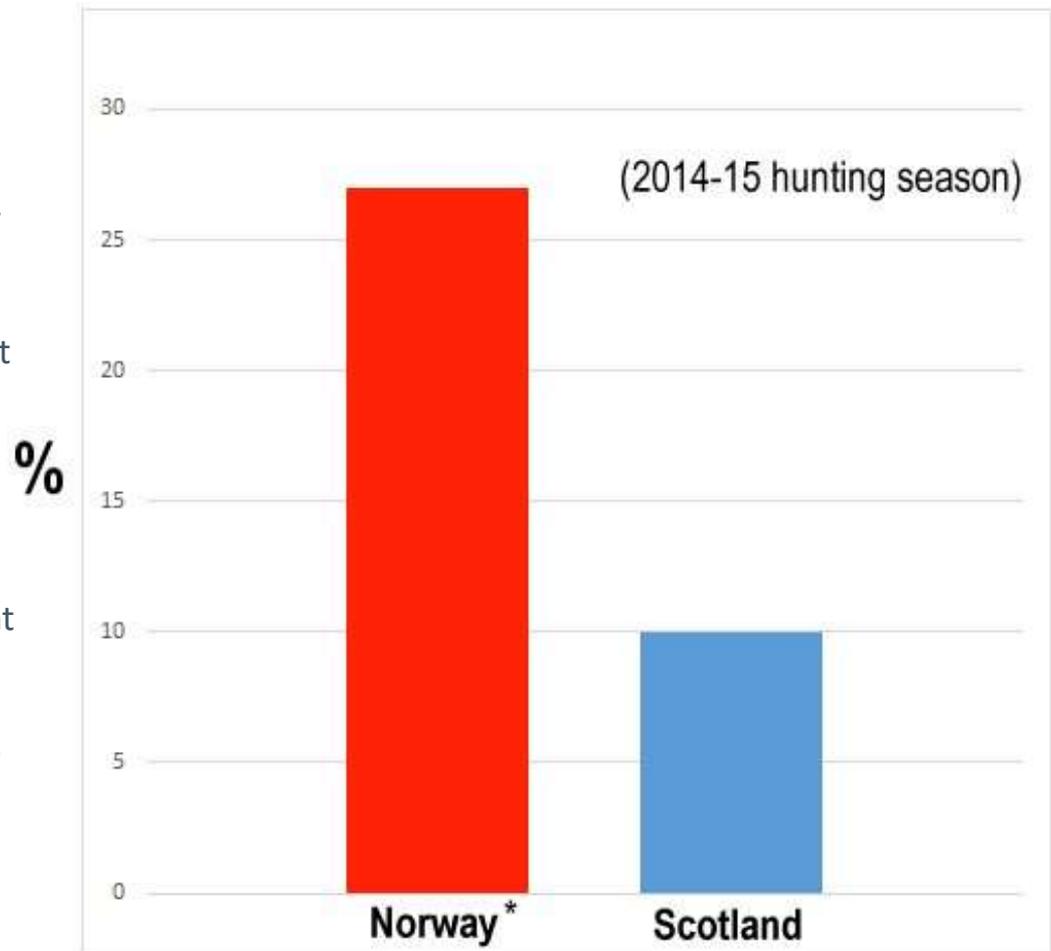
Data: [www.hjorteviltregisteret.no](http://www.hjorteviltregisteret.no); <http://affrickintaildmg.deer-management.co.uk>

Year given is year hunting season began (ie 2011 = 2011-12 hunting season)



- Red deer are the main deer species hunted in the Highlands and in SW Norway.
- The two areas are closely similar in climate, geology, and landforms.
- Both used to be strongly deforested.
- Woodland in red deer areas of SW Norway now regenerates by natural means.
- While woodland in red deer areas of the Highlands generally does not.
- Red deer offtake in deer hunting areas, per unit area, is similar in the two regions.
- How does Norway achieve the same harvest levels per unit area as Scotland, but still get woodland regeneration?
- The key to understanding this is the the higher offtake levels in Norway.
- Population densities are *lower*, allowing regeneration, but harvests are sustainably *higher* per unit area, in both venison weight and trophy head quality terms.
- This is because red deer in SW Norway and elsewhere are very much larger than in the Highlands (and this is not for genetic reasons).
- And because well-nourished deer breed more rapidly, and non-hunting deaths (eg winter starvation) are rare.
- The result is just as many, but much bigger, deer are harvested - from land which has multiple other economic uses in addition.

## Red Deer harvest as % of estimated population



Data

Norway: [www.naturindeks.no](http://www.naturindeks.no); [www.hjortevilt.no](http://www.hjortevilt.no)  
 Scotland: SNH Deer Management Review 2016

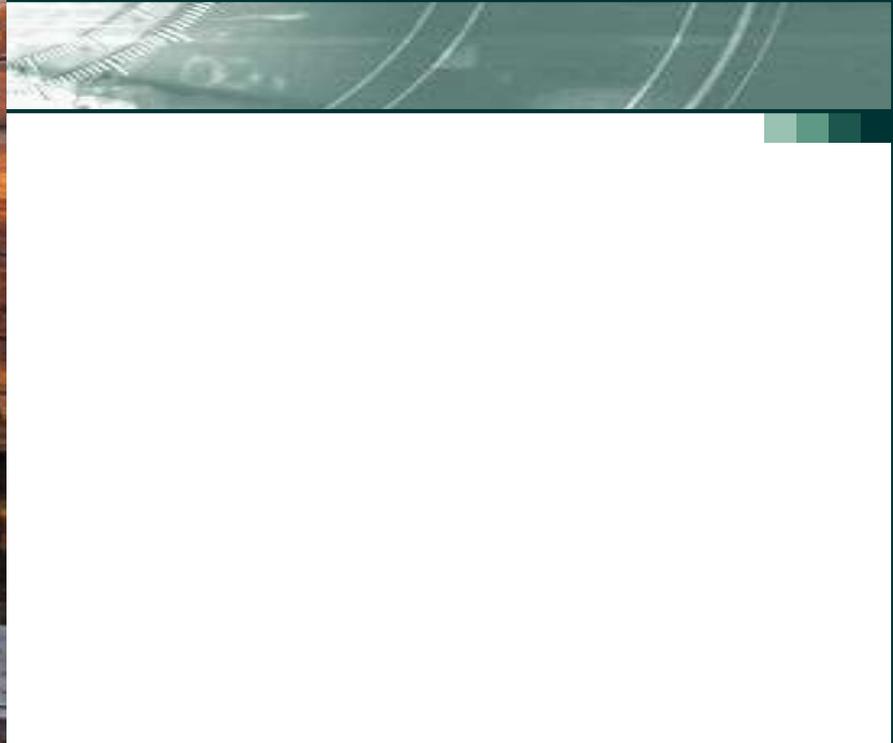
\*Of which 47% hinds or hind calves. No sex ratio data Scotland.



# Gathering







# Artisanal products





**“Farming (*landbruk*) has historically always devoted itself to value creation from all available natural resources” - Per Skorge, Secretary General Norwegian Farmer’s Association, 2017.**

- Value creation in Highlands & Islands ‘landbruk’, including crofting, is based on the biological productivity of the land.
- That land is currently performing well below its potential productivity, biologically and therefore economically.
- It is in the interests of crofters, of the wider community, and of the Scottish Government (even construed in the narrowest economic terms) that a change to a landscape which is producing at its potential, happens.
- Woodlands of the type exploited in multiple ways by farmers in Norway, are the key element in achieving greater sustained productivity from the Highlands & Islands landscape.
- SW Norway provides many ‘worked examples’ of how this change happened, how it is maintained, and how it is used.
- It also shows that assertions that ‘it can’t be done’ are untrue. SW Norway has done it. Not doing it in the Highlands & Islands is therefore a choice.
- None of which is to suggest Scotland should just copy Norway. Both landscapes are ‘cultural landscapes’, and have been for millennia, in which practice and policy have been, and are now, strong shapers (intentionally or otherwise) of what happens.
- But Norway provides insights which can be drawn on for moving to, and value creation in, a more productive Highlands & Islands landscape.



Photo: Erlend Tøssebro