

Norway: Ecology & Environment

12% of Norway is wilderness (48% in 1900), defined as more than 5km from any road or track. There is public right of access (*allemansretten*) to uncultivated land everywhere, provided no damage is done, but there are restrictions in protected areas. Lighting fires in the open, including paraffin/petrol stoves, is prohibited from 15 April to 15 September.

Norwegians care for the countryside; there is little litter and industrial waste is highly regulated. About 24% of all waste is household waste, half of which is recycled. Car purchase prices include a recycling charge to ensure they are returned to a scrap metal centre. The government has an active climate change policy and has undertaken to reduce carbon emissions by 10% more than its Kyoto commitment by 2012 and a total of 30% by 2020, becoming carbon neutral by 2030. In 1996, Statoil's Sleipner oilfield was the world's first to store CO₂, about one million tonnes a year. Pollution by chemicals injurious to human health has decreased but those affecting the environment have increased. Despite improvements in recent decades, acid rain (90% of which comes from other European countries) is still a serious problem affecting vegetation, water and fish in southern Norway and Finnmark; 27% of inland lakes and rivers and 17% of coastal waters are classified as 'at risk'.

Away from towns and cities, rural areas have little light pollution. The night is very dark and many stars and the Milky Way are visible with the naked eye, unlike most of the UK.

Due to the range of latitude, topography and climate, Norway has a larger variety of ecological zones and habitats than any other European country. From 1904, the DNT lobbied hard for a nature protection act, eventually agreed in 1954. There are now 40 National Parks (with a further 5 planned) where the landscape, marine environment, plants and wildlife are protected. 14% of mainland Norway and 57% of Svalbard is protected within these parks, 1790 nature reserves, 174 protected landscapes and 200 other types of protected areas, most with little tourist development; access is mostly via toll roads. The endangered or vulnerable list of 1 988 species (2006) of flora and fauna includes 430 fungi mostly associated with small areas of old-growth forests, 90 birds and 25 mammals.

Current national parks:

Blåfjella-Skjækerfjella 1924 km², Nord-Trøndelag, established 2004 (info centre, trails, cabins) <<http://www.nasjonalparken.no>>

Breheimen, 1707 km², Sogn og Fjordane, Oppland, 2009 (varied glacier-formed landscape from sea level to 2000m)

Børgefjell, 1447 km², Nord-Trøndelag, Nordland, 1963 (alpine vegetation, birds, info centre)

Dovre, 289 km², More og Romsdal, Oppland, Sør-Trøndelag, 2003 (trails, cabin)

Dovrefjell-Sunndalsfjella, 1693 km², More og Romsdal, Oppland, Sør-Trøndelag, 2002 (Europe's most diverse alpine ecosystem, highlands, musk ox, reindeer Arctic fox, wolverine, Fokstumyra marshes rich in birdlife, info centres, trails, cabins)

<<http://www.nasjonalparkriket.no>>

Femundsmarka, 673 km², Sør-Trøndelag, Hedmark, 1971 (glaciers, highlands, lake, musk ox, reindeer, falcon, trails, cabins, shelters)

Folgefonna, 545 km², Hordaland, 2005 (third largest glacier, cabin)

<<http://www.folgefonna.info>>

Forlandet, 4647 km², (616 km² land, 4031km² marine), Svalbard, 1973 (northernmost nesting place of some birds, seal and walrus breeding grounds)

Forollhogna, 1062 km², Sør-Trøndelag, Hedmark, 2001 (trails)

Gressåmoen, 182 km², Nord-Trøndelag (original spruce, birds)

Gutulia, 23 km², Hedmark, 1968 (primeval forest, info centre, trail)

Hallingskarvet, 450 km², Hordaland, Buskerud, 2006 (ice age landscape, trails, cabin)

Hardangervidda, 3422 km², Hordaland, Telemark, Buskerud, 1981 (upland plateau, largest wild reindeer herds, info centre, trails, cabins)

<<http://www.hardangervidda.org/enmeny.html>>

Indre Wijdefjorden, 1127 km² (745 km²land; 382 km²marine), Svalbard, 2003
Jostedalbreen, 1310 km², Sogn og Fjordane, 1991 (glaciers, mainland Europe's largest icecap, info centres, trails, cabins) <<http://www.jostedalsbre.no>>

Jotunheimen, 1151 km², Oppland, Sogn og Fjordane, 1980 (includes all Northern Europe's peaks over 2300m, highest Galdhøpiggen 2469m, and 60 glaciers, info centres, trails, cabins) <<http://www.nasjonalparkriket.no>>.

Junkerdal, 682 km², Nordland, 2004 (botanical reserve, info centre, trails)

Lierne, 333 km², Nord-Trøndelag, 2004 <<http://www.nasjonalparken.no>>

Lomsdal-Visten, 1102 km², Nordland, 2009

Møysalen, 51 km², Nordland, 2003 (Lofotens last wilderness, info centre, trails)

Nordenskiöld Land, 1362 km² (1207 km² land; 155 km² marine), Svalbard, 2003

Nordre Isfjorden, 2954 km² (2050 km² land; 904 km² marine), Svalbard, 2003

Nord-Vest Spitzbergen, 9914 km² (3683 land; 6231 marine), Svalbard, 1973 (ice field, archaeological sites, caribou and marine mammal breeding grounds)

Ormtjernkampen, 9 km², Oppland, 1968 (old pine forest, birch forest, trail)

Rago, 171 km², Nordland, 1971 (high peaks, deep valleys, waterfalls, beaver, wolverine, info centre, trails. cabin)

Reinheimen, 1974 km², Oppland, Møre og Romsdal, 2006 (reindeer, wolverine, golden eagle, gyrfalcon, trails)

Reisa, 803 km², Troms, 1986 (gorge, waterfalls, wildlife, trails. cabins)

Rondane, 963 km², Oppland, Hedmark, 1962 (28 mammal species including lemming, reindeer, 124 bird species, archaeological sites, info centres, trails. cabins)

<<http://www.nasjonalparkriket.no>>.

Saltfjellet/Svartisen, 2105 km², Nordland, 1989 (moors, icecaps, Sami archaeological sites, info centre, trails. cabins)

Sassen-Bünsow, 1230 km² (1157 km² land; 73 km² marine), Svalbard, 2003

Seiland, 316 km², Finnmark, 2006

Skarvan og Roltdalen, 441 km², Nord-Trøndelag, Sør-Trøndelag, 2004 (trails. cabins)

Stabbursdalen, 747 km², Finnmark, 1970 (world's northernmost pine forest, info centre, trails. cabins)

Sør-Spitzbergen, 13282 km² (5025 km² land; 8257 km² marine), Svalbard, 1973 (65% of land is glacier or permanent snow, seabird breeding grounds)

Varangerhalvøya, 1804 km², Finnmark, 2006

Ytre Hvaler, 354 km² (14 km² land; 340 km² marine), Østfold, 2009 (boats)

Øvre Annarjåkka, 1390 km², Finnmark, 1975 (birch and pine forests, bogs, lakes, trails. cabins)

Øvre Dividal, 750 km², Troms, 1971 (Arctic rhododendron and heather, wolverine, trails. cabins)

Øvre Pasvik, 119 km², Finnmark, 1970 (tundra bogs, virgin taiga forest, rare birds, moose, wolf, wolverine, lynx, last habitat of brown bear, trails)

Ånderdalen, 125 km², Troms, 1970 (bogs, ancient coastal pine and birch forests, trails)

Future national parks:

Goahteluoppal, ~300 km², Finnmark (trails)

Rohkunborri, 571 km², Troms (trails)

Sjunkhatten, 417 km², Nordland

Treriksrøysa, ? km², Troms

Tysfjord-Hellemobotn, ~1000 km², Nordland (boat)

Bouvet Island has been a nature reserve since 1977; it is almost entirely glaciated with no inhabitants. There is an automatic meteorological station.

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<<http://www.environment.no>> is a comprehensive site on everything environmental.

Flora: There are fewer tree species in Norway than western North America areas with a similar climate because the mountain, Baltic and North Seas barriers prevented post-ice age migration. Mild temperatures along the western coast allow some hardy species of palms to grow in the north and planted deciduous trees like horse chestnut and beech thrive north of the Arctic circle in a suitable soil and microclimate. Plants needing comparatively more summer sunshine, less humidity and tolerant of cold winters occur in the southeast and inland areas. There are species where both winter and summer climate is important such as Pedunculate oak, European ash and Dog's Mercury. Other plants are dependent on the type of bedrock. Alpine species mainly in the mountains and Arctic tundra are intolerant of comparatively long warm summers; many are common in the North Boreal zone and some in the Middle Boreal zone. Many hardy species have adapted to use more than one summer to ripen seeds. Imported plants have been able to ripen seeds and spread and less than half the 2 630 plant species (about 250 flowering) in Norway today occur naturally. About 210 species are listed as endangered.

Norway has four floristic zones in the Circumboreal Region: Nemoral, Hemiboreal, Boreal and Alpine Tundra. Nemoral (0.5% of land area) lies along the southern coast below 150m elevation up to 30km along valleys, with oak dominating and no Norway spruce or grey alder. Hemiboreal, or Boreonemoral (7% of land area) follows the coast from Oslofjord to Ålesund reaching an elevation of 200m or up to 400m in southern valleys and some sheltered fjords and valleys further north. Nemoral species dominate southwest facing slopes on good soil, while boreal species dominate on north facing slopes and waterlogged soil. Nemoral species (needing high humidity with low tolerance of winter frost) are English oak, sessile oak, European ash, elm, Norway maple, hazel, black alder, lime, yew, holly (only on SW coast), wild cherry, ramsons, beech (only common in Vestfold), bell heather and *primula vulgaris*. Typical boreal species are Norway spruce, pine, downy birch, grey alder, aspen, rowan, wood anemone and *Viola riviniana*. Boreal species are adapted to a long cold winter; most can tolerate colder temperatures than occur in Norway. The large boreal zone has three subzones: South Boreal, Middle Boreal and North Boreal. Bogs are common in the boreal zone, the largest areas in North and Middle zones, as well as just above the tree line. Heather is common in all upland boreal areas and berries, particularly blueberries, bilberries, crowberries and cranberries, are found throughout the boreal zones; cloudberries are common in marshes. Woodland fungi are widespread in the autumn. The South Boreal (12% of the land area) is dominated by boreal species, and has a few scattered broadleaf deciduous trees. Some species in this zone need fairly warm summers and are very rare in the middle boreal zone, eg black alder, hop, oregano and guelder rose. The zone occurs above the hemiboreal zone, up to 450m in Østlandet, 500m in southern valleys and coastal areas further north below 180m. Agriculture, including grain cultivation, takes place mostly in the hemiboreal and South Boreal zones.

Middle Boreal (20% of land area) is located up to 800m in southern valleys down to 100m maximum in Troms with small pockets further north. This is the most northerly area with some farming. It typically has closed-canopy forest dominated by the commercially important Norway spruce. Silver birch, yellow bedstraw, raspberry, mugwort and *Myrica gale* are species in this zone. Birch is usually dominant in northern areas, but pine, aspen, rowan, bird cherry and grey alder are also common. Birch is often a cross between silver birch and downy birch, larger than birch growing near the tree line. Some alpine plants grow in this zone, nemoral species are rare. The understory is usually well developed if the forest is not too dense.

North Boreal, or open or sparse taiga (28% of land area) is the zone closest to the tree line, bordering the alpine or polar area with its harsh subarctic climate. It is located up to 1200m in central mountain areas, 500m on the western coast. North Norway is dominated by this zone. Trees grow very slowly and do not get very large; the forest is not as dense. The tree line is mostly mountain birch, a subspecies of downy birch; in the far north, it grows down to sea level. Inland, the tree line includes spruce and pine and lower areas also have conifers. Alpine plants are common.

Alpine Tundra (32% of land area) is the area above the tree line and reaches 1 500m in

Jotunheimen and about 800m in the Lofotens; it includes most of Hardangervidda. The low alpine area has continuous plant cover with willow species up to 0.5m tall, blueberry, common juniper and twinflower; it was traditionally used as summer pastures. The higher mid-alpine tundra has smaller plants, mosses and lichens; plants still cover most of the ground even if snowfields last into mid-summer. The highest high-alpine tundra ground is dominated by bare rock, snow and glaciers, with few plants. Glacier buttercup has been found 100m below the summit of Galdhøpiggen and mosses and lichens at the summit. Svalbard and Jan Mayen have tundra vegetation except for areas covered by glaciers; some areas are fertilized by sea bird colonies. Sheltered fjord areas in Spitsbergen with higher summer temperatures, little snow and earlier snowmelt have about 165 species of small plants including dwarf birch, cloudberry, Svalbard poppy and harebell. The Svalbard Global Seed Vault, a seed conservation repository established by the Global Crop Diversity Trust and the Norwegian Government, is located under permanent ice on Spitsbergen.

Fauna: Native wild mammal species include Insectivores: Western European hedgehog (S Norway), Common shrew, Eurasian pygmy shrew, Eurasian least shrew, Taiga shrew, Laxmann's shrew, Eurasian water shrew. Bats: Daubenton's bat, Natterer's bat, Whiskered bat, Brandt's bat, Parti-coloured bat, Northern bat, Common noctule, Soprano Pipistrelle, Nathusius's pipistrelle, Common long-eared bat. Lagomorphs: European rabbit, European hare, Mountain hare. Rodents: Red squirrel, European beaver (S Norway), Wood lemming, Norway lemming, Northern red-backed vole, Bank vole, Grey red-backed vole, Northwestern water vole, Muskrat (introduced), Field vole, Root vole, Sibling vole (Svalbard only), Harvest mouse, Yellow-necked mouse, Wood mouse, Brown rat, House mouse, Northern birch mouse. Cetaceans: Sowerby's beaked whale, Bottle-nosed whale, White whale, Narwhal, Sperm whale, Common porpoise, Striped dolphin, Common dolphin, Risso's dolphin, Bottle-nosed dolphin, Atlantic white-sided dolphin, white-beaked dolphin, Killer whale, Pilot whale, Minke whale, Sei whale, Fin whale, Blue whale, Humpback whale, Bowhead whale. The North Atlantic right whale is now extinct in Norwegian waters. Other marine mammals: Walrus, Common seal, Ringed seal, Harp seal, Bearded seal, Grey seal, Hooded seal. Carnivores: Raccoon dog (introduced), Red fox, Arctic fox, Polar bear (Svalbard only), Stoat, Least weasel, American mink (introduced), European polecat, Pine marten, Badger (S Norway), Otter (S Norway) and in remote areas Eurasian wolf, Wolverine, Brown bear and Eurasian lynx. Even-toed ungulates: Fallow deer (introduced), Red deer, Elk, Roe deer, Reindeer. Cattle: Musk ox (introduced). Global warming is threatening polar bears but also increasing the number and spread of deer.

The Hardangervidda has Europe's only wild reindeer, about 15 000. There are organised elk, musk ox, beaver, seal, whale or sea eagle watching safaris in some areas. Polar bears, arctic fox, reindeer, Svalbard caribou, seals, walrus and several species of whale are found in Svalbard but independent travel is not permitted because of the danger from polar bears; you must always use a local guide.

Reptiles & Amphibians: There are 7 reptile and 5 amphibian species. The only poisonous snake is the adder (hoggorm), found in most of Norway south of Tysfjord near Narvik. They are rarely seen but be observant when in wilderness areas.

Birds (fugler): There are 473 recorded species in Norway. Flocks of sea birds found at Runde, near Ålesund include half a million including kittiwake, puffin in summer, razorbill, guillemot, gannet, fulmar, shag, oyster catcher, curlew, eider, shelduck, white-tailed eagle, eagle owl, peregrine falcon, golden eagle. On the islands of Røst and Værøy in the Lofotens, there are razorbill, black guillemot, kittiwake, fulmar, tern, gannet, puffin, cormorant, skua, little auk, black-tailed godwit, white-tailed eagle; there are also seals and occasional killer whales. The Fokstumyra marsh area near Dombås has over 80 species including great snipe, hen harrier, whimbrel, lapwing, Temminck's stint. Gray sea eagles are found in Troms. Rough legged buzzard, osprey, short-eared owl, pygmy owl, eagle owl, snowy owl, waxwing, red throated diver, horned grebe, corncrake and dipper are also seen. There are nature reserves throughout Norway — ask for details at tourist offices. Collecting eggs of specified sea birds in some areas is permitted within specified periods.

For a list of bird species see <http://en.wikipedia.org/wiki/List_of_birds_of_Norway>. Norwegian Ornithological Society <<http://www.birdlife.no/organisasjonen/english.php>> <nof@birdlife.no>

Insects: About 15,000 species have been recorded but many are still unknown and the total is estimated at 23,000 species. The vast number of lakes and marshes are breeding grounds for many insects including mosquitoes and biting flies. Ticks are becoming more common.

There is a zoo at Kristiansand <<http://www.dyreparken.com>>, a polar zoo in Troms and aquariums in Bergen, Tromsø, Trondheim and Ålesund.

There is a certified ecotourism scheme for businesses that meet over 100 nature and sustainability criteria. <<http://www.grip.no/okoturisme/english%20info.htm>>

Books: Marine Mammals of the North Atlantic, by Carl Christian Kinze (Princeton University Press 2003 ISBN 978 069 111 308 1) £12.82