



# Norway's Environmental Targets



NORWEGIAN MINISTRY OF  
THE ENVIRONMENT

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## Useful websites:

[www.miljo.no](http://www.miljo.no)  
[www.environment.no](http://www.environment.no)  
[www.klif.no](http://www.klif.no)  
[www.dirnat.no](http://www.dirnat.no)  
[www.npolar.no](http://www.npolar.no)  
[www.ra.no](http://www.ra.no)  
[www.statkart.no](http://www.statkart.no)

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Norway's Environmental Targets was published in Norwegian in 2011. This translated version contains some updates and corrections, but has not been completely revised.



## Action for the environment

Thirty years ago, acid rain was killing fish in Norwegian rivers. Now, both salmon and trout are back again in many rivers thanks to concerted national and international efforts to cut emissions.

Norway's nature reaches from the deepest seabed to the topmost mountain peaks, and from the thickest forest to the highest waterfall. Rivers and lakes have always attracted people, who use them for transport, food and energy, and now also for enjoyment. Water is a basic necessity, and in much of Norway we can drink it straight from the source. Running water still pervades the Norwegian landscape, even though nine of our eleven waterfalls have been harnessed for hydropower production. Wetlands purify water entirely free of charge, and are highly productive ecosystems. Stronger action is needed to safeguard these vulnerable ecosystems.

The seas too support a rich variety of living organisms. Norway's seas are some of the most productive in the world – a blue-green, self-replenishing treasure chest. But seabirds such as puffins and guillemots are seriously threatened. We must redouble our efforts to save them.

However, most of the threatened plants and animals in Norway are forest species. Forests are the home of the red helleborine, one of our most beautiful orchids, and of the lynx, brown bear and wolf. Without protection measures, these species would have disappeared from Norway.

Almost one third of Norway's spectacular mountain landscapes are protected. Wild reindeer, lemming, wolverine and Arctic fox are some of the species we find here. Thanks to breeding programmes and other action, the Arctic fox has so far been saved from extinction.

People have always left evidence of their activities behind them, altering the environment for better or worse. Our cultural heritage does more than tell our history – it is also part of a dynamic contemporary environment. But it, too, is vulnerable: once buildings and cultural landscapes are destroyed or removed, they are lost for ever.

People all over the world are moving to cities. Even in Norway, most of us live in built-up areas. Environmental protection is also concerned with how we organise our everyday lives. People want to live near workplaces, theatres, cinemas, museums and shops, partly because they want to avoid dependency on cars. At the same time, they want to be close to the countryside. Norwegians are great outdoor enthusiasts.

Wherever we live, we are entitled to an unpolluted environment that promotes good health and welfare. We used to be able to see pollutants in the smoke from factory chimneys. Nowadays they are just as likely to exit through the gate in the manufactured products. Local air quality in Norway's largest towns is still not good enough. We must take fresh action to deal with these problems.

Climate change is perhaps the greatest threat humanity has ever faced. The Earth's temperature is rising. To ignore this would be a crime against our own and future generations. That is why Norway's goal is stabilisation of the global climate system.

In this publication you can read about Norway's environmental targets and what we are doing to reach them. Many of the targets are ambitious and will not be easy to achieve, but we know that environmental action does produce results.

# Priority areas and tools for achieving our goals

This publication presents the priority areas of Norway's environmental policy and the main policy instruments the Ministry of the Environment uses to achieve its goals. For each priority area, a specific set of national targets has been drawn up, based on government policy as set out in white papers and other policy documents. These are listed in the appropriate chapters. The Norwegian Nature Index is one of the tools we are using to measure progress towards our targets.

Norway's targets for biodiversity also reflect the Aichi Targets. These were adopted in 2010 by the parties to the Convention on Biological Diversity in Nagoya, Japan, as part of the Strategic Plan for Biodiversity. According to its mission statement, the overall aim is to "take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services".

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## environment.no

This website provides up-to-date information on the state of the environment and environmental trends in Norway. Some of the information is presented in English, and more complete information is available from the Norwegian version of the website, [miljostatus.no](http://miljostatus.no).

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## What is the Norwegian Nature Index?

The Nature Index is designed to show trends in biodiversity in major ecosystems, and is expressed on a scale from 0 to 1. The values show deviation from a reference state, which is given the value 1 and is intended to represent an ecologically sustainable state. The value 0 indicates large deviations from the reference state, for example the extinction of a species within a particular area. The overall objective is to measure whether Norway is succeeding in halting the loss of biodiversity, as we have undertaken to do under the Convention on Biological Diversity.

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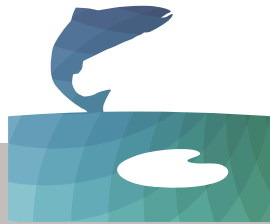
## Norwegian Red List for Ecosystems and Habitat Types

The Norwegian Biodiversity Information Centre made a first assessment of the status of ecosystems and habitats in 2011, and published a Red List on the same pattern as national and international Red Lists for species. It is only available in Norwegian at present.

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**Living seas and coastal environments**



**Healthy lakes and rivers**



**Rich and varied wetlands**



**Forest diversity**



**Spectacular mountain landscapes**



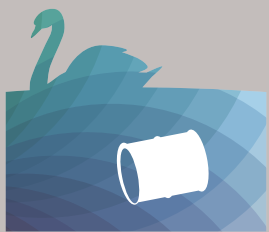
**A valuable cultural heritage**



**A good urban environment**



**The great outdoors**



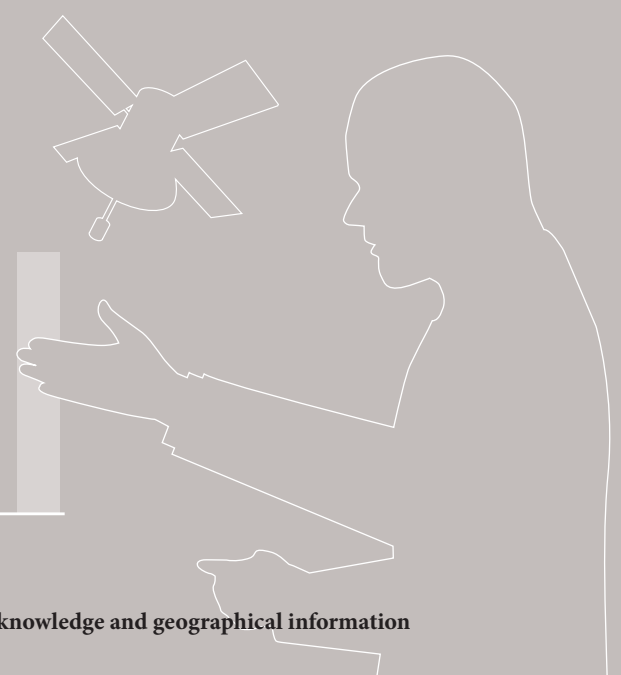
**An unpolluted environment**



**Clean air**



**A stable climate**



**Instruments: legislation and planning procedures; international cooperation; knowledge and geographical information**



# Living seas and coastal environments

Imagine a deep blue-green treasure chest that replenishes itself. Norway is one of the fortunate countries that actually possesses one – the cold, clean waters off its coast. We must take good care of our treasures so that they can be enjoyed by future generations as well.

Natural resources from the sea have made Norway one of the world's foremost maritime nations. We have always drawn on marine and coastal waters for growth and prosperity. Today, Norway's largest export industries are the offshore oil and gas industry and the fisheries. Maritime transport is another important industry, and there are busy ports all along Norway's long coast. Offshore wind power is a new sector, with considerable growth potential in Norwegian waters. And of course, visitors from all over the world are attracted to Norway's spectacular coastal scenery and

clean waters, and tourism and outdoor recreation are also a vital part of the economy.

Norway's seas support a rich variety of marine life. There are internationally important fish stocks such as herring (*Clupea harengus*), cod (*Gadus morhua*) and capelin (*Mallotus villosus*), and seabirds such as puffins (*Fratercula arctica*), Brünnich's guillemots (*Uria lomvia*) and little auks (*Alle alle*). Marine mammals include walrus (*Odobenus rosmarus*), bearded seal (*Erignathus barbatus*) and beluga (*Delphinapterus leucas*). On the seabed, there are some of the

world's largest cold-water coral reefs, which provide a unique habitat of global importance. Many of the species found in the coastal zone are highly specialised to deal with extremes such as the alternation between submersion and drying out in the intertidal zone or exposure to salt spray above the shoreline.

## **Kelp, fish and seabirds at risk**

Norway's maritime areas stretch 200 nautical miles out from the coast of the mainland, Svalbard and Jan Mayen, and are about six times larger than its land territory. They include large



relatively shallow areas in the North Sea, the Barents Sea and the continental shelf areas along the coast, and this is one reason for the high biodiversity in Norway's waters. Much of the biological production in the world's oceans is concentrated in shallow waters.

Habitat types vary widely, from the deep seabed via the water column, the continental slope, shallow waters and fishing banks to tidal areas along the coast. Different habitats provide food and shelter for everything from the largest whales to the smallest zooplankton species. Many seabirds feed largely on fish, and the location of their largest breeding colonies depends to a large extent on where food supplies are most plentiful. Seabirds are an important element of coastal and marine ecosystems, and are good indicators of the state of the marine environment. A number of seabird populations along the Norwegian coast have declined so steeply that scientists are very concerned. The common guillemot (*Uria aalge*), for instance, is classified as critically endangered on the 2010 Norwegian Red List. The situation is now so serious that it is only a question of time before it disappears as a breeding species from many colonies along the Norwegian coast.

Kelps, corals and sponges support species-rich communities of plants and animals in the coastal zone and on the continental shelf. These species grow into complex structures that offer suitable conditions for a wide variety of small species – and these in turn serve as food for fish and seabirds. We know relatively little about the overall status of these habitat-forming species, but we do know that coral reefs, sponge communities and kelp forests are very vulnerable to bottom fishing gear such as trawls.

Kelps (*Laminaria hyperborea* and sugar kelp, *Saccharina latissima*) grow in dense stands called kelp forests all along the Norwegian coast. It is not unusual to find up to 100 different species associated with a single kelp plant. *Laminaria hyperborea* has declined because of overgrazing by

sea urchins, but has shown some signs of recovery. Sugar kelp has declined dramatically because of a combination of higher water temperature, eutrophication and sediment deposition, and the rapid loss of sugar kelp forests is continuing in the southern half of the country.

It is estimated that about 80 % of the sugar kelp along the Skagerrak coast of Norway has disappeared, and that about 40 % has been lost along parts of the North Sea coast (Rogaland and Hordaland).

Only 3 % (88 species) of the threatened and near-threatened species on the 2010 Norwegian Red List are marine plants and animals. They include dwarf eelgrass (*Zostera noltei*) the shrimp *Sclerocrangon ferox*, European flat oyster (*Ostrea edulis*), European eel (*Anguilla anguilla*), golden redfish (*Sebastes marinus*) and basking shark (*Cetorhinus maximus*). Threatened seabirds include the kittiwake (*Rissa tridactyla*), common guillemot, puffin and common tern (*Sterna hirundo*).

Typical coastal species include the grey seal (*Halichoerus grypus*) and common seal (*Phoca vitulina*), and coastal cod and various other fish species that use kelp forests and other coastal habitats as spawning grounds and nursery areas. Various types of seaweeds, barnacles and many other invertebrates are also found in this zone. About 13 % (485 species) of the threatened and near-threatened species on the Norwegian Red List are associated with the coastal zone. Insects and other small animals dominate the list, but there are also 79 threatened species of flowering plants. These include musk orchid (*Herminium monorchis*), northern marsh orchid (*Dactylorhiza purpurella*) and yellow horned poppy (*Glaucium flavum*). Threatened insect species include a butterfly, the chequered blue (*Scolitantides orion*), and the hairy-legged mining bee (*Dasypoda hirtipes*).

The 2011 Norwegian Red List for Ecosystems and Habitat Types distinguishes between deep-water and shallow-water marine habitats. Deep-water marine habitats on the list include coral reefs and mud volcanoes, both of which are classi-

## Nature Index results

For benthic species, the state of biodiversity is better in the deep Norwegian Sea than in the shallower Barents Sea, North Sea and Skagerrak. For pelagic species, the situation is best in the Barents Sea (Nature Index value 0.76) and somewhat poorer in the Norwegian Sea (0.68) and North Sea (0.62). The poorest results were obtained in the Skagerrak (0.49).

## National targets

### – Living seas and coastal environments

- 1.1. The structure, functioning, productivity and diversity of marine ecosystems will be maintained or restored and they will provide a basis for value creation through the sustainable use of natural resources and ecosystem services.
- 1.2. All coastal waters will have at least good ecological and chemical status or, if appropriate, good ecological potential, by 2021.
- 1.3. Management of all harvested stocks of fish, invertebrates and seaweeds will be ecosystem-based, and they will be harvested sustainably.
- 1.4. The extinction of threatened marine species will be halted and the status of declining species will be improved by 2020.
- 1.5. The most seriously threatened habitat types will be classified as selected habitat types.
- 1.6. A representative selection of Norwegian nature in areas covered by the geographical scope of the Nature Diversity Act will be protected for future generations.
- 1.7. The conservation value of marine protected areas will be maintained or restored.
- 1.8. By 2015, the cumulative effects of human activities on coral reefs and other vulnerable ecosystems that are affected by climate change or ocean acidification will be minimised, in order to maintain ecosystem functioning as fully as possible.
- 1.9. The most seriously threatened species will be classified as priority species.
- 1.10. Substantial adverse impacts on biological or landscape diversity in connection with the import and release of alien organisms will be avoided. Eradication, containment

fied as vulnerable, while in shallow waters, sugar kelp forests in the Skagerrak and the North Sea are listed as endangered and vulnerable respectively. Seven habitats in the coastal zone, including sand dune systems and tidal meadows, are also on the Red List. So far, no marine species have been designated as priority species under the Nature Diversity Act, nor have any marine habitats been designated as selected habitat types.

The waters off Svalbard and the coastal zone of the archipelago support large numbers of seabirds, and various mammals including several seal species, walrus, polar bear (*Ursus maritimus*) and Arctic fox (*Vulpes lagopus*). There are close links between marine ecosystems, the drift ice and coastal ecosystems in Svalbard. Seabirds and mammals use both land and ice-covered areas of sea for foraging and reproduction.

### Scaling up monitoring and mapping programmes

All kinds of human activities affect Norway's seas and coastal ecosystems. Pressures include fisheries, shipping and oil and gas production, and runoff of nutrients and other pollutants from land. Long-range transboundary pollution is an example of an external pressure. Another is climate change, which results in rising sea temperatures, melting sea ice and ocean acidification. Climate change may have serious impacts on certain key species and species communities, particularly in northern waters and in Svalbard.

Norway's sea areas are now being managed on the basis of the integrated management plans for the Barents Sea–Lofoten area and the Norwegian Sea. A similar management plan for the North Sea and Skagerrak is being prepared and will be completed in 2013. Internal waters (inside the baselines) are managed together with river systems under the



Water Management Regulations. Both these management regimes are based on the principles of conservation and sustainable use.

A sound knowledge base is essential for managing marine and coastal ecosystems and is therefore a key factor in preparing, implementing and updating the management plans. A great deal of recent information on the marine environment has been obtained through the MAREANO programme for mapping of the seabed and the SEAPOP programme for mapping and monitoring of seabirds. Norway is also monitoring ocean acidification, for example as part of the Marine Pollution Monitoring Programme.

Harvesting is the pressure that has most effect on fish and marine mammals. At present the most important commercial fish stocks, such as capelin, herring and cod, are being harvested within safe biological limits. Fishing pressure on certain smaller stocks such as blue ling, golden redfish and beaked redfish has been too high, and steps must be taken to build them up again.

Norway has a special responsibility for the management of several seabird species, including a number of populations that are declining rapidly. A group of experts has been appointed to look into the links between this decline and the availability of prey species, and make proposals for action.

The management plans identify particularly valuable and vulnerable areas, where special care should be taken to avoid disruption. For instance, the framework for oil and gas activities is designed to safeguard these areas, and this is one reason why waters off the Lofoten and Vesterålen Islands and Senja and near the coast of Møre og Romsdal county have not been opened for petroleum activities. Oil pollution can arise during normal activities (operational discharges) or as a result of



accidents (spills from offshore installations, shipping or onshore sources). Oil spills can endanger threatened species and habitats. Norway has zero-discharge targets for the oil and gas industry, which state that as a general rule, there must be no discharges of oil or environmentally hazardous substances to the sea. If companies are drilling in areas where there are corals or other vulnerable benthic organisms, even stricter conditions apply to prevent damage to the fauna.

Pollution is still a serious problem in many coastal waters and fjords, even though much has been done to reduce pollution. In the Arctic, the main problems are related to persistent, bioaccumulative and toxic substances that are transported over long distances with ocean currents and in the atmosphere. These problems can only be resolved through international cooperation.

There has been a considerable increase in the introduction and spread of alien species to the marine environment in recent years. In some cases they are released accidentally with discharges of ballast water, while others are deliberately and illegally introduced or spread naturally from neighbouring areas. The Government intends to take steps to eradicate or control particularly invasive alien species that are already established in marine and coastal areas by 2015. The Ballast Water Convention will play an important role here. It has not yet entered into force, but Norway has already implemented its provisions and adopted its own ballast water regulations. In addition, Norway is drawing up an action plan to combat alien species in Svalbard.

The greatest threat in the coastal zone comes from changes in land use – including all types of building and construction, development and land reclamation. As a general rule, building and construction is not allowed in the 100-metre belt nearest the shoreline, but despite this, too much development is still taking place along the shoreline in a number of areas. To improve the situation, central government planning guidelines for the shoreline have

been adopted. They divide the country into different zones, and require local authorities to enforce the general prohibition most strictly in densely populated areas that are under most pressure. Aquaculture in the coastal zone can also have negative environmental impacts: for example, wild fish may become infected with salmon lice, escaped fish may interbreed with wild fish, and there may be pollution from fish farms. Monitoring of pollutants from fish farms is being intensified.

One important tool of an integrated policy for the marine environment and of ecosystem-based management is the establishment of marine protected areas. Norway has undertaken international commitments in this area under the Convention on Biological Diversity and the OSPAR Convention for the protection of the marine environment of the North-East Atlantic, and is in the process of developing a network of marine protected areas.

At present, the coastal zone in Svalbard and the surrounding seas and drift ice are not much affected by local activity. As a general rule, the fauna is protected, but limited hunting and trapping of a few named species is permitted. Most of the coastline and 87 % of Svalbard's territorial waters are protected, and the Svalbard Environmental Protection Act also provides safeguards for non-protected areas. Shrinking sea ice cover is making Svalbard's coastline more and more easily accessible, and it is therefore important to regulate the growing cruise traffic and research activity both within and outside the protected areas. Management plans are being drawn up for the protected areas, and an action plan is being prepared for the polar bear population, which is particularly vulnerable to the impacts of climate change. A number of other species are threatened in Svalbard, including seabirds such as the razorbill (*Alca torda*) and ivory gull (*Pagophila eburnea*) and marine mammals such as the bowhead whale (*Balaena mysticetus*), walrus and common seal. However, the authorities know too little about population trends for many species in Svalbard.

or control measures will be initiated or implemented for particularly invasive alien organisms that are already established in the Norwegian environment.

- 1.11. Genetically modified organisms that are deliberately released, cf the Gene Technology Act, will not have adverse impacts on biodiversity.
- 1.12. Norwegian inputs of nutrients and particulate matter to coastal waters that are affected by eutrophication or sediment deposition will be reduced to a level that ensures good chemical and ecological status by 2021.
- 1.13. Operational discharges will not result in damage to health or the environment, or result in a rise in background levels of oil or other environmentally hazardous substances in the long term.
- 1.14. A low level of risk of damage to health or the environment as a result of acute pollution will be maintained, and continuous efforts will be made to reduce the level of risk.
- 1.15. Municipal, county and regional planning will help to prevent undesirable building on the shoreline and ensure sustainable use of resources along the coast.
- 1.16. Transport and travel in Svalbard will not cause serious or permanent damage to the vegetation or disturb animal life. It will be possible to enjoy the natural environment undisturbed by motor traffic and noise even in areas that are easily accessible from the settlements.
- 1.17. The current extent of wilderness-like areas in Svalbard will be retained, biological and landscape diversity will be maintained virtually untouched by local human activity, and the value of protected areas as reference areas for research will be safeguarded.



# Healthy lakes and rivers

Water is everywhere in the Norwegian landscape, and where would we be without it? Norway is privileged in having abundant supplies of clean fresh water.

Cascading waterfalls, whitewater rapids and slow-flowing lowland rivers. Wide lakes where the wind whips up the waves and hidden tarns in the forest, dark and mysterious in the summer twilight. From the mountains to the coast, Norway has an endless variety of lakes and ponds, rivers and streams. These river systems support a world of plants and animals, perfectly adapted to their surroundings and to each other. Often called the life-blood of the planet, rivers transport water and nutrients and are a vital part of the hydrological cycle.

Rivers and lakes have always played an important part in Norway's industrial and

social development. Rivers were transport arteries for timber and other goods; they supplied fish for the table and water for the crops. Water power has been used to drive machinery and sawmills since long before hydroelectricity was even thought of, and people have always settled near rivers. More recently, we have learnt to enjoy a wide range of outdoor recreation activities using rivers and lakes. Water is in a state of constant change and movement, and there is always something to do – fishing, taking photographs, messing about in boats, skating, or damming a stream with the children. And last but not least, we drink water – and in much

of Norway we can drink it straight from the source.

## Land of 500 000 lakes

Fresh water covers about five per cent of the total area of Norway – rivers, streams, rivulets, lakes, tarns and ponds. In total, there are around half a million lakes of every size, from the smallest pond upwards. In the northernmost county of Finnmark alone there are about 180 000 lakes. As the numbers suggest, most of them are not particularly large. On the other hand, some of them are extremely deep. The four deepest lakes in Europe are all in Norway, and are all deeper than 450 metres.



Salmon fishing at the outlet from lake Fevatnet, Møre og Romsdal  
© Svein Magne Fredriksen/Ministry of the Environment

The flora and fauna of lakes and rivers varies widely. Two of the most important factors are whether the water is hard or soft (high or low calcium content) and the acidity level (pH). As a general rule, hard water supports a wider variety of species than softer water, although there are often relatively few species of aquatic plants in calcareous lakes.

Lakes above the treeline in the mountains are generally relatively poor in nutrients. In addition, the growing season is of course short, and species diversity is low. But as anyone who has fished in mountain lakes knows, numbers of fish may be very high.

## Freshwater pearl mussels and dune tiger beetles

Freshwater pearl mussels are one of a small minority of species with a life span of more than 100 years – some individuals may live for up to 200 years. They spend part of their larval stage attached to the gills of trout or salmon. Adult mussels settle in the gravel of the river bed. A large proportion of the European population of this species is found in Norway, and it has been found in rivers in every county. It is an offence to harvest pearl mussels, and the most important reason for its decline today is damage and disturbance to its habitat.

The dune tiger beetle is a predatory beetle, 15 millimetres long, that feeds on other insects. In Norway, dune tiger beetles are found almost exclusively on sand and silt banks along the larger rivers. They have been recorded along eight rivers in south-eastern and central Norway and Finnmark. The larvae live in burrows in the sand and catch prey that come within reach, while the adult beetles hunt on the open sand. The most important cause of their decline is physical disturbance of their habitat, such as watercourse regulation, gravel extraction and road construction.

Other important environmental factors in fresh water are currents, temperature and the substrate on the lake floor or river bed. Flowering plants find suitable conditions where the bottom is soft, consisting of fine-grained material such as gravel, sand, silt or clay. Hardly any of them can grow on solid rock or boulders and coarse gravel, which are characteristic of most river beds. These tend to be dominated by mosses and algae, often in large quantities. The very slippery conditions often found on river beds are caused by dense algal growth on rock and boulders. In all, 97 species of flowering plants have been registered in freshwater habitats in Norway. They are far outnumbered by phytoplankton, the largest group, with 1050 registered species. Algae are also a very varied group, and about 900 species have been recorded.

Approximately 2 800 animal species in Norway spend all or part of their life cycle in fresh water. They include fish, amphibians, insects, crustaceans, a wide variety of zooplankton and certain mammals. Insects and crustaceans are the dominant groups: crustaceans are entirely aquatic, but many insects lay their eggs in water and have aquatic larvae.

Two very different mammal species are highly dependent on fresh water – beaver (*Castor fiber*) and otter (*Lutra lutra*). The otter is a predator, a fast and agile swimmer that hunts fish and can also live in the sea. However, it needs fresh water to drink and to clean salt from its fur, and therefore needs access to rivers. The bea-

ver is Norway's largest rodent. It almost died out in Norway around 1900, but is now relatively common again in southern and eastern parts of the country.

A total of 45 species of freshwater fish have been recorded in Norway, including perch (*Perca fluviatilis*), pike (*Esox lucius*) and non-migratory brown trout (*Salmo trutta*) and Arctic char (*Salvelinus alpinus*). Most people are familiar with the Atlantic salmon (*Salmo salar*), whether they buy it from the shop, farm salmon for a living or enjoy the thrills of fly fishing for wild salmon running the river. Farmed salmon have been bred from salmon stocks from Norwegian rivers, and wild fish can provide the genetic diversity needed for further development of the industry. Wild salmon populations have declined all over Europe, and Norway is now a stronghold of the species – about one third of all wild Atlantic salmon breed in Norwegian rivers. The world's most productive salmon river is the Tana river in Finnmark. All this means that Norway has a special responsibility to safeguard salmon stocks.

Freshwater habitats are also important foraging and breeding areas for about 80 of Norway's bird species, including ducks, geese, grey heron (*Ardea cinerea*) and common crane (*Grus grus*).

About 7 % of Norway's red-listed species are associated with freshwater habitats. There are 20 species of stone-worts (*Characeae*) in Norway, 17 of which are considered to be threatened. They are largely restricted to calcareous

## National targets

### – Healthy lakes and rivers

- 2.1. The extinction of threatened freshwater species will be halted and the status of declining species will be improved by 2020.
- 2.2. All water bodies will have at least good ecological and chemical status or, if appropriate, good ecological potential, by 2021.
- 2.3. There will be no downgrading of the status of any water body as a result of an increase in inputs of nutrients or particulate matter from new activity, of the requirements of the Water Management Regulations.
- 2.4. Management of all harvested stocks of freshwater animals and plants will be ecosystem-based, and they will be harvested sustainably, so that they are found in viable populations in their natural ranges by 2020.
- 2.5. The most seriously threatened habitat types will be classified as selected habitat types.
- 2.6. Protection of river systems will be maintained and a representative selection of Norwegian lakes and rivers will be protected for future generations.
- 2.7. The conservation value of protected areas will be maintained or restored.
- 2.8. The most seriously threatened freshwater species will be classified as priority species.
- 2.9. Wild salmon stocks, including their genetic diversity, will be safeguarded so that they are found in viable populations in their natural distribution areas.

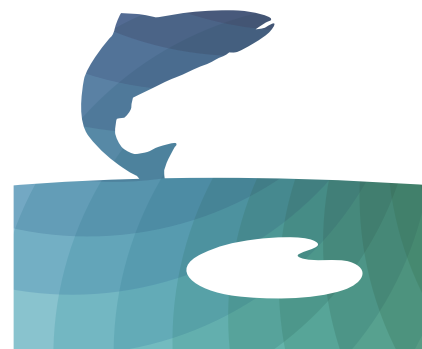
lakes. Four of Norway's six amphibians and many of its dragonfly species are on the 2010 Red List. Other threatened freshwater species include star duckweed (*Lemna trisulca*), slender naiad (*Najas flexilis*), shining ram's-horn snail (*Segmentina nitida*), noble crayfish (*Astacus astacus*), pool frog (*Rana lessonae*), dune tiger beetle (*Cicindela maritima*), freshwater pearl mussel (*Margaritifera margaritifera*) and northern crested newt (*Triturus cristatus*).

The wild salmon is not threatened as a species, but the number of salmon stocks has declined considerably. About 45 Norwegian salmon stocks are now extinct, and one third of the 440 remaining stocks are considered to be threatened. The otter is classified as vulnerable.

The 2011 Norwegian Red List for Ecosystems and Habitat Types includes seven habitat types, two of which are soft oligotrophic lakes (poor in nutrients and calcium, and with very clear water) and calcareous lakes (which are very unusual in Norway, where there is little calcium in the bedrock). The latter are included in the first list of selected habitat types under the Nature Diversity Act. This means that special care must be taken to avoid their loss or habitat deterioration, and an action plan has been drawn up describing how they are to be safeguarded.

### Integrated water management

Almost half of Norway's lakes and rivers are at risk of failing to achieve good ecological and chemical status or better by 2021. This is the objective set out in the national Water Management Regulations, which are based very closely on the EU Water Framework Directive. The most important pressures on Norway's river systems are runoff from agriculture, hydropower developments and long-range transboundary pollution. Integrated, ecosystem-based management and planning is the most effective way of improving the situation.



To ensure an integrated planning system for all water bodies from mountain top to fjord, Norway has been divided into 16 river basin districts. River basin management plans are being drawn up, one for each district. All environmental pressures will be considered together in the plans, so that it is possible to choose the most cost-effective ways of improving environmental status.

Norway is keeping to the EU timetable on a voluntary basis, and has established management plans for about 20 % of all its water bodies. These are now being put into practice. The remaining management plans are to be completed by 2015. They will provide guidelines for local and national planning and action by the authorities, and will be used to ensure that environmental status is improved where necessary and maintained where it is already satisfactory.

Norway also has a Protection Plan for Watercourses, under which 388 river systems have been protected against hydropower development. However, 15 of Norway's 20 highest waterfalls have already been regulated, and there are plans for widespread construction of small-scale power plants, which would leave more dry waterfalls and stream beds. Applications for hydropower developments are processed by the Norwegian Water Resources and Energy Directorate, together with the municipalities. The municipalities are responsible for dealing with proposals for other types of developments in the 100-metre belt nearest rivers and lakes.

### Safeguarding wild salmon

Fish farming is the greatest overall problem for wild salmon, through infection with sea lice (*Lepeophtheirus salmonis*) and escapes of farmed fish. Sea lice are

## High Nature Index values for freshwater

The Nature Index shows that the overall state of biodiversity in freshwater is good, with an index value of 0.78, and that conditions have improved since 1990.



also a serious problem for a number of sea trout populations. In freshwater habitats, hydropower and other developments and the salmon parasite *Gyrodactylus salaris* are the greatest threats to wild salmon. Liming of rivers and lakes has reduced the problems caused by acid rain, but must be maintained to safeguard salmon stocks that have been re-established. An effective campaign against *Gyrodactylus* has eradicated the parasite from about 20 river systems.

One of the main steps taken to safeguard wild salmon is the establishment of a system of 52 national salmon rivers and 29 national salmon fjords. This is intended to give some of the most important salmon stocks special protection against developments and activities that could disrupt their freshwater habitats, and against fish farming, pollution and physical disturbance in fjords and coastal waters near the mouths of these rivers. The system targets stocks with special features (large numbers of salmon; high productivity or a potential for high productivity; stocks with distinctive genetic features, such as particularly large or small fish size).

Plants and fish that are not native to a river or lake can be a serious threat to the ecosystem. They may compete for the same food as indigenous species or carry dangerous diseases. An action plan against alien fish species is being prepared, and several counties are drawing up regional action plans targeting their specific problems. New regulations are being drawn up on the import and release of alien organisms, and will become effective in 2013. They will include rules on the release of fish outside their natural distribution range, the import of animals and plants for aquaria, and the release

of organisms to garden ponds. There will also be provisions on the cleaning and treatment of fishing gear, boats and other equipment. Action against problem species (both native and non-native) will continue. In freshwater habitats, these include *Gyrodactylus*, crayfish plague (*Aphanomyces astaci*), which has been introduced with the North American signal crayfish, and bulbous rush (*Juncus bulbosus*). Bulbous rush is a native species, but has spread explosively in parts of Norway in recent years.

Most rivers and lakes in Svalbard are within the national parks and nature reserves, and are under little pressure from human activity. Landlocked Arctic char are the only freshwater fish in Svalbard, and are found in about 100 lakes and rivers. In some river systems, populations are still considerably depleted as a result of earlier overfishing. The content of PCBs in Arctic char from Bjørnøya is so high (the highest ever measured in the Arctic) that people are advised not to eat large fish. More knowledge is needed as a basis for managing the Arctic char populations in Svalbard.

### Freshwater pearl mussels and dune tiger beetles

Freshwater pearl mussels are one of a small minority of species with a life span of more than 100 years – some individuals may live for up to 200 years. They spend part of their larval stage attached to the gills of trout or salmon. Adult mussels settle in the gravel of the river bed. A large proportion of the European population of this species is found in Norway, and it has been found in rivers in every county. It is an offence to harvest pearl mussels, and the most important reason for its decline today is damage and

disturbance to its habitat.

The dune tiger beetle is a predatory beetle, 15 millimetres long, that feeds on other insects. In Norway, dune tiger beetles are found almost exclusively on sand and silt banks along the larger rivers. They have been recorded along eight rivers in south-eastern and central Norway and Finnmark. The larvae live in burrows in the sand and catch prey that come within reach, while the adult beetles hunt on the open sand. The most important cause of their decline is physical disturbance of their habitat, such as watercourse regulation, gravel extraction and road construction.

- 2.10. Substantial adverse impacts on biological or landscape diversity in connection with the import and release of alien organisms will be avoided. Eradication, containment or control measures will be initiated or implemented for particularly invasive alien organisms that are already established in the Norwegian environment.
- 2.11. Genetically modified organisms that are deliberately released, cf the Gene Technology Act, will not have adverse impacts on biodiversity.
- 2.12. Norwegian inputs of nutrients and particulate matter to lakes and rivers that are affected by eutrophication or sediment deposition will be reduced to a level that ensures good chemical and ecological status by 2021.
- 2.13. Municipal, county and regional planning will help to prevent undesirable building in the 100-metre belt along rivers and lakes.



# Rich and varied wetlands

Did you know that wetlands are some of the most productive ecosystems in the world? There are wetlands of different kinds in every corner of Norway, and 51 of them are considered to be of international importance.

The variety of wetlands in Norway is greater than almost anywhere else in Europe. Wetlands are vital but often undervalued systems – they purify water, provide natural flood control, are attractive recreational areas and support a rich bird life. We must make sure they are not mismanaged or destroyed and maintain them so that we can continue to enjoy these benefits.

Wetlands are the many different habitat types in the transitional zone between land and water, from estuaries and lowland marshes to upland bogs. They include some of the most productive ecosystems in the world, with a huge

variety of animals and plants, and a feast for hungry birds.

Many wetlands, particularly peatlands, act like sponges and can absorb large volumes of water. This means that they soak up rainfall and protect against destructive flooding, and then release water slowly, acting as water storage reservoirs in dry periods. They also have a unique capacity to purify water. They lock up large quantities of carbon, and draining and developing peatlands releases this as carbon dioxide. Peatlands can also act as a natural archive, preserving seeds, pollen and remains of plants and animals at different depths in the oxygen-free environment. This means

they can tell us a great deal about the climate, fauna and flora of earlier times.

Until now, we have not properly appreciated the value of our wetlands, either in Norway or in the rest of the world. They are being lost more quickly than other types of ecosystems, and are now among the world's most seriously threatened areas. To safeguard wetlands for the future, we must make people more aware of just how important they are for all of us.

## **Hungry sundew and ingenious mosses**

About 10 % of mainland Norway is covered by wetlands, mostly peatland

– bogs or mires. The Norwegian Nature Index divides Norway's wetlands into mires, springs and floodplains, including river deltas. Mires and springs are both habitat types where the water table is high, either all year round or at certain times of year. The species we find here are adapted to living in areas where the soil is saturated with water. Floodplains along rivers and lakes are regularly flooded and constantly changing as the water erodes away material in some areas and deposits silt and sand elsewhere.

Mires are divided into a number of different types, but all of them have a high water table, so that the soil is more or less saturated with water and oxygen levels are low except very close to the surface. Many species would be unable to survive under these conditions, but a wide variety of plants and animals have evolved specialised features that allow them to thrive here. Species diversity is high in the surface layers of the peat.

For example, 47 of the 50 European species of sphagnum mosses occur in Norwegian bogs. These mosses are specifically adapted to the waterlogged conditions. The tips of their shoots grow rapidly, while the plant dies from below. Much of the peat that builds up below the living plants on the surface of the bog is formed from dead sphagnum mosses.



oxygen, for example sundews (*Drosera*) and butterworts (*Pinguicula*). These species are also carnivorous: they catch and digest small insects, and this allows them to survive the nutrient-poor conditions.

The number of plant species varies widely from one type of bog to another. Rain-fed (ombrotrophic) bogs are very poor in nutrients, and may only support around 20 species of flowering plants: mineral-rich bogs, on the other hand, may support as many as 200 species.

The insect life of bogs and fens is particularly rich. The most striking species are butterflies and dragonflies, particularly the hawk dragonflies (*Aeshna*), which are some of Norway's largest insects and can often be seen patrolling their territories in summer. The upper layer and surface of the peat also support many insects, including large numbers of beetle species, and in addition many different spiders. Where the water is not too acidic, frogs and newts live in open water and pools. Wetlands also support a characteristic bird fauna. Many species of waders depend on wetlands, but there are also geese, ducks, rails and some passerines. They use wetlands as breeding sites and as staging areas during migration. Some also use them as wintering and moulting areas.

Springs cover only a small area, and are supplied by oxygen-rich groundwater. They have a characteristic flora including three-flowered rush (*Juncus triglumis*), yellow saxifrage (*Saxifraga aizoides*) and many different mosses. There are fewer species of animals, but insects found in and around springs include chironomid midges, mayflies, stoneflies and diving beetles.

Today, relatively little peatland is being lost in Norway through drainage and conversion into farmland. However, these processes have previously caused a great deal of damage, and most of the areas that have been lost cannot be restored. About 15 % (443 species) of Norway's threatened species are associated with wetlands. Most of the plant species on the 2010

## Nature Index: moderate scores for wetlands

According to the Norwegian Nature Index, the state of wetland biodiversity is only moderate, with an overall index value of 0.55.

Many of the flowering plants that grow on bogs have air-filled stem and root tissues, for example many species of sedges (*Carex*), cotton grass (*Eriophorum*) and bogbean (*Menyanthes trifoliata*). Other plants survive the conditions by living near the surface where there is plenty of

## National targets

### – Rich and varied wetlands

- 3.1. The extinction of threatened wetland species will be halted and the status of declining species will be improved by 2020.
- 3.2. The diversity of natural wetland types will be maintained or restored within their natural range, so that there are viable populations of all wetland species. Genetic diversity and important ecological functions and services will be maintained.
- 3.3. The most seriously threatened wetland habitat types will be classified as selected habitat types.
- 3.4. The most seriously threatened wetland species will be classified as priority species.
- 3.5. A representative selection of wetlands will be protected for future generations.
- 3.6. The conservation value of protected areas will be maintained or restored.
- 3.7. Substantial adverse impacts on biological or landscape diversity in connection with the import and release of alien organisms will be avoided. Eradication, containment or control measures will be initiated or implemented for particularly invasive alien organisms that are already established in the Norwegian environment.
- 3.8. Municipal, county and regional planning will help to prevent undesirable development in wetlands.

Norwegian Red List grow on nutrient-rich bogs. They include Hudson Bay sedge (*Carex heleonastes*), marsh helleborine (*Epipactis palustris*), white adder's-mouth orchid (*Malaxis monophyllos*) and slender green feather-moss *Hamatocaulis vernicosus*.

Wetlands are important breeding grounds for several Norwegian bird species that are listed on the international IUCN Red List: the lesser white-fronted goose (*Anser erythropus*), great snipe (*Gallinago media*), curlew (*Numenius arquata*) and black-tailed godwit (*Limosa limosa*). The corncrake (*Crex crex*), moor frog (*Rana arvalis*) and northern crested newt (*Triturus cristatus*) are other wetland species on the Norwegian Red List.

### Protection for 600 valuable areas

Ever since the first farmers began to cultivate land in Norway, people have used mires and floodplains to graze livestock and for haymaking – and in some areas of the country, bogs were mown for hay until the 1950s. Over many years, these forms of traditional use create semi-natural vegetation types that include a wide variety of light-demanding species, many of which are now threatened. The 2011 Norwegian Red List for Ecosystems and Habitat Types includes 16 wetland habitat types. Many of the most valuable remaining wetland areas have now been protected under the Nature Diversity Act, or before that, under the Nature Conservation Act. County conservation plans for wetlands have resulted in the establishment of more than 600 nature reserves. The protected areas include 51 wetland systems that are on the list of wetlands of international importance under the



Ramsar Convention. Three of these are Stabburnsneset in Finnmark (part of a river delta), Nordre Øyeren in Akershus (Norway's largest inland delta) and Åkersvika in Hedmark (permanent freshwater and marsh and seasonally flooded areas near Lake Mjøsa).

The lesser white-fronted goose and the black-tailed godwit have been designated as priority species under the Nature Diversity Act, while mires traditionally used for haymaking have been designated as a selected habitat type, which means that special care must be taken to avoid their loss or habitat deterioration.

### Lesser white-fronted goose

The lesser white-fronted goose is classified as critically endangered in the Norwegian Red List, and is also red-listed internationally. Only a hundred years ago, it was a common sight in Norway, from Nord-Trøndelag county and northwards. But from the early 1900s, intensive hunting led to a dramatic reduction in the population. Nowadays, illegal hunting along migration routes is a threat to the small remaining number of geese. In May 2011, the lesser white-fronted goose was designated as a priority species under the Nature Diversity Act, and there is also an international action plan to save the species. The foundation Nordens Ark has hatched and released goslings, and steps have been taken to reduce the red fox population on the breeding grounds in Finnmark in the far north of Norway.



Wetlands have been under great pressure for many years, both in Norway and in the rest of the world. Many have been damaged or destroyed. Changes in land use, for example road construction, drainage and hydropower developments, are the main threat to 85 % of the threatened species that are associated with wetlands. At least one third of the original area of mire under the treeline in Norway has been converted to agricultural land or developed, and numbers of many species associated with floodplains have dropped as a result of hydropower developments.

Norway seeks to safeguard wetlands through conservation and sustainable use. This is being done by ensuring that protected areas include a representative selection of all types of wetlands. More wetland habitat types may also be designated as selected habitat types. The municipalities have the primary responsibility for land-use planning in Norway, and therefore also have an important role to play in maintaining wetlands. Management plans are being drawn up for the 600 wetland nature reserves. In many other wetlands, restoration work is needed to remedy earlier damage, and Norway's goal is to restore half of them by 2020. Plans are being drawn up for this work. The authorities are also providing information to raise public awareness of the importance of wetlands, especially through the information centres for national parks and other areas.

In Svalbard, wetlands make up a large proportion of the tundra in ice-free valleys and the coastal plains. They include moss tundra and other wet tundra types, lakes, river plains, deltas and shallow coastal



areas with islands and skerries. These areas are very valuable for migratory geese, ducks and waders. On the whole, wetlands in Svalbard are not much affected by human activities and land use change. Many of the most important areas are within the nature reserves and national parks, which cover 67 % of the land area of the archipelago. In June 2011, four areas (Bjørnøya, Hopen, Sørkapp and Nordenskiöldkysten) were listed as Ramsar sites. Five smaller areas were already on the Ramsar list. All the Ramsar sites in Svalbard are protected under the Svalbard Environmental Protection Act.

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## A tiny carnivore

Sundews (*Drosera*) are fascinating little plants that grow on nutrient-poor bogs. They make up for a shortage of nitrogen by catching insects using the sticky droplets on the tentacles lining their leaves. Insects that are attracted by the scent of the plant are caught by the tentacles, enveloped and then gradually digested so that the plant can absorb the nitrogen. Brutal perhaps, but ingenious. There are three different sundew species in Norway, and all of them grow on bogs.

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# Forest diversity

If you want to find birds and mammals in the wild in Norway, our forests are the places to visit. But these mysterious and diverse landscapes are also home to a vast number of other living things.

Deep in the forests there are dark, quiet spaces where the forest floor is carpeted with green moss. You can pick berries and mushrooms to your heart's content. There are shady hollows where the trees stand close together, but on hilltops where the soil is shallow a view will suddenly open up between the scattered trees. Where the trees are tall, the forest is dim and full of secrets, with lichens hanging from every branch. Moss covers the tree stumps and the wind sings through the tree-tops. It's not surprising that Norwegian poets and artists have often sought inspiration in the forest. Even today, it is easy to understand why

our forbears believed in trolls and other mystical beings. Although much of the old-growth forest has gone, we can still experience the peace and beauty of the forest and, for the artistically inclined, find inspiration for paintings, music or literature.

Forests have also been a vital part of the economy throughout Norway's history, providing food, fuel and building materials. Norway was already exporting timber by the 1300s. Forestry and wood processing are still major industries today and make an important contribution to the local, regional and national economy.

## **An endless variety of plants and animals**

Forests cover about 130 000 square kilometres of Norway, or one third of the area of the mainland. Productive forest – meaning forested areas that can produce at least one cubic metre of timber per hectare per year – covers about 75 000 square kilometres.

The altitude of the treeline differs greatly from one part of the country to another, depending on the climate. In Finnmark in the far north, it descends all the way to sea level, whereas in some inland areas in the south it is as high as 1200 metres. Norway's forest landscapes



## Low Nature Index values for forest

In 2010, the state of biodiversity in forest was found to be relatively poor (overall Nature Index value 0.43). The lowest figures were recorded for Central Norway and Hedmark county.

are less broken up by agriculture and settlements than in many other European countries because there are only relatively small areas that are suitable for farming.

Forest and mountain are the most widespread main ecosystem types in Norway. Trees provide a particularly wide range of structures, habitats and three-dimensional environmental variation, so that forests can support more species than other ecosystems. Tree crowns, tree trunks and branches each support distinctive communities, and dead trees form new habitats. Standing and fallen dead wood is broken down and recycled by a large number of species from many different groups. These features explain why 60 % of all species registered in Norway are associated with forests.

Forests are divided into two main types, coniferous and broad-leaved, but mixed forests are also common. Norwegian coniferous forests are dominated by Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*). Scots pine grows best on dry, nutrient-poor soils, and pine forests are therefore found mainly on sandy moraines and dry ridges, especially in inland areas of southern Norway where rainfall is relatively low. Spruce prefers deep soil and plenty of water. The most widespread type of broad-leaved forest is boreal (northern), dominated by aspen (*Populus tremula*), birch (*Betula*), rowan (*Sorbus aucuparia*), goat willow (*Salix caprea*) and grey alder (*Alnus incana*), and often mixed with coniferous forest. Temperate broad-leaved forest is dominated by tree species that prefer a warmer climate, such as oak (*Quercus*) ash (*Fraxinus excelsior*), hazel (*Corylus avellana*), black alder (*Alnus incana*), small-leaved lime (*Tilia cordata*) and beech (*Fagus sylvatica*). This type of forest is found mainly near the coast in southern and western Norway. Mountain birch (*Betula pubescens* ssp *tortuosa*) generally forms a belt between the coniferous forest and the tree limit in the mountains.

Since the 1990s, steps have been taken

to reduce the negative impacts of logging and afforestation, but the ecological state of many forest areas is so poor that close monitoring of developments is needed. About 1840 species, or 50 % of all threatened or near-threatened species in Norway, are associated with forests. Some examples are the orchid red helleborine (*Cephalanthera rubra*), the lichen *Usnea longissima*, a number of fungi and mosses, and various species of flies. Threatened mammal species associated with forests include brown bear (*Ursus arctos*), wolf (*Canis lupus*) and two species of bats, barbastelle (*Barbastella barbastellus*) and Natterer's bat (*Myotis nattereri*). Where the eagle owl (*Bubo bubo*) – which is listed as endangered – is found in inland areas, it generally nests in forested areas. There are 19 forest habitat types on the 2011 Norwegian Red List for Ecosystems and Habitat Types. They include coastal spruce forest, coastal pine forest, ultramafic forest and calcareous lime forest.

The most species-rich groups in forests are arthropods (particularly insects and arachnids), fungi, lichens and mosses. The animal groups most people are familiar with, such as birds and mammals, make up less than one per cent of all forest species. Many different species of fungi make the nutrients in dead plant material available to other species by breaking down cellulose and lignin. There are huge quantities of fungi in forests, but mostly hidden underground and inside dead wood and other plant material, in the form of mycelium, a network of microscopic filaments called hyphae. We do not become aware of them until they form fruiting bodies – mushrooms and toadstools on the ground and bracket fungi on trees.

Many Norwegian forests also support a wide variety of lichens and mosses thanks to their geographical situation near the coast and plentiful rainfall. These plants lack a root system, and absorb nutrients directly from surface water. Mosses and lichens are the dominant vegetation on surfaces where there is no soil, such as

## National targets

### – Forest diversity

- 4.1. The extinction of threatened forest species will be halted and the status of declining species will be improved by 2020.
- 4.2. The diversity of habitat types in forests will be maintained or restored within their natural range, so that there are viable populations of all indigenous species. Genetic diversity and important ecological functions and services will be maintained.
- 4.3. Management of all harvested stocks of forest animals and plants will be ecosystem-based, and they will be harvested sustainably, so that they are found in viable populations in their natural ranges by 2020.
- 4.4. All forestry areas will be sustainably managed by 2020.
- 4.5. There will be 65 litters of lynx, 13 litters of brown bear and 3 litters of wolf a year, and 850–1200 breeding pairs of golden eagle.
- 4.6. The most seriously threatened forest habitat types will be classified as selected habitat types.
- 4.7. The most seriously threatened forest species will be classified as priority species.
- 4.8. A representative selection of forest habitat types will be protected for future generations.
- 4.9. The conservation value of protected areas will be maintained or restored.

boulders, rock and tree trunks, where they do not need to compete for space with flowering plants. The flowering plants that thrive in coniferous forests include various species of the heath family (Ericaceae), including purple heather (*Calluna vulgaris*), bilberry (*Vaccinium myrtillus*) and cowberry (*Vaccinium vitis-idaea*). In broad-leaved forests, *Hepatica nobilis*, wood anemone (*Anemone nemorosa*), wood sorrel (*Oxalis acetosella*) and grasses such as wood fescue (*Festuca altissima*) are common species.

Roe deer (*Capreolus capreolus*), mice and voles, red squirrel (*Sciurus vulgaris*) and red fox (*Vulpes vulpes*) are the forest mammals you are most likely to encounter. If you are lucky enough to actually see Norway's largest terrestrial mammal, the moose (*Alces alces*), rather than just finding tracks or droppings, it will be something you remember for a long time. Upland forests nearer the treeline are an important habitat for the golden eagle (*Aquila chrysaetos*). Three of Norway's four large carnivores (lynx, brown bear and wolf) are mainly forest dwellers. The lynx, our only wild cat, is elusive and rarely seen, and has always fired the imaginations of northern peoples. In Norse mythology, the goddess Freya was said to use two lynxes to pull her chariot.

### Protecting areas of national importance

The forest landscape in Norway today is strongly influenced by even-aged management practices, which include clear-cutting and planting of seedlings, and require a network of forest roads. Norway spruce can live for up to 500 years and Scots pine for 700–800 years, but they are logged commercially as



“teenagers”, when they are about 80 years old. Since the 1990s, the forestry industry has taken steps to improve its environmental performance, for example by leaving more dead wood in place, which benefits a wide range of species. Nevertheless, much remains to be done. According to the 2010 Norwegian Red List for Species, more than 1400 threatened and near-threatened species associated with forests are being negatively affected by forestry. Logging has negative impacts on many species, as do planting of non-native tree species and the construction of forest roads. In a number of cases, timber has been cut in key biotopes or areas of high conservation value. For many years, the forestry industry has planted alien tree species or trees that are not native to the area (for example Norway spruce along the west coast). Some of these are now spreading widely and are a threat to the characteristic species and habitats of many protected areas. The construction of new forest roads causes fragmentation of habitats and is one of the main causes of the loss of truly undisturbed areas in Norway (“areas without major infrastructure development”, which are defined as lying at least 1 km from the nearest development, including forest roads).

All this makes it important to continue and expand forest conservation efforts. About 2.5 % of all productive forest has been given strict protection under the Nature Diversity Act, or before that, under the Nature Conservation Act, in nature reserves or national parks. Forestry operations are not permitted in these areas. In future, new areas owned by the state, the church and individuals will be protected. Areas in private ownership will as far as possible be protected on a voluntary basis. Important forest types

## Brown bear

Until the 1600s, there were brown bears throughout Norway and Sweden. It is estimated that there were still about 5 000 bears in the mid-1800s, about 65 % of them in Norway. The counties of Sogn og Fjordane, Møre og Romsdal, Telemark and Aust-Agder were the strongholds of the species. In the 19th century, both Norway and Sweden introduced bounty systems for bears that proved to be highly effective. Sweden abolished its system in 1893, and in Norway the central government stopped paying bounties in 1930. When the population decline finally stopped around 1930, there were only about 130 brown bears left in Norway and Sweden. In Norway, local bounty payments were made right up to 1972, but from 1973 bears have been strictly protected. Despite this, the brown bear became extinct as a breeding species in Norway during the 1980s. Since then, the Norwegian-Swedish population has gradually risen, and bears now range across much of central and northern Sweden. The Norwegian distribution reflects the situation in Sweden, and the distribution of female bears in Norway is closely related to the distribution of breeding females in Sweden. The Swedish population was estimated at 3 300 bears in 2008, and 151 individuals were identified in Norway in 2011.



are being registered so that the most valuable areas can be protected, with a special focus on temperate broad-leaved forests. The red helleborine has been designated as a priority species under the Nature Diversity Act, and lime forest on calcareous soils as a selected habitat type. More forest species and habitats may be designated as this work continues.

Habitat types are gradually being mapped throughout Norway. Forests are being given priority in this work as so many threatened species and habitat types are to be found there. The removal of non-native tree species, for example from nature reserves in forest, will be continued. New regulations regulating planting and sowing of non-native tree species will be adopted under the Nature Diversity Act. The forestry sector has the main responsibility for controlling the spread of non-native tree species that have previously been planted.

The Government will amend the legislation on forest road construction so that areas without infrastructure development are safeguarded, and ensure that administrative procedures safeguard areas of importance for biodiversity and areas of high conservation value.

In 2011, the political parties in the Storting (Norwegian parliament) reached agreement on management of the four large carnivores and golden eagle (*Aquila chrysaetos*). The agreement retains the

dual goals of the management regime – to maintain livestock grazing in forested and other uncultivated areas, and to maintain populations of all four carnivores and golden eagle. There will be a clear division into zones where the carnivores are given priority and others where livestock have priority. In areas where the carnivores are given priority, the aim is to achieve the population targets (number of litters per year).

The Government will take steps to safeguard the eagle owl, in particular to avoid mortality as a result of electrocution and collisions with power lines.

The Norwegian authorities have not so far approved any use of genetically modified organisms in agriculture or any release of such organisms into the environment. However, the use of genetically modified organisms is increasing in other countries, and it is therefore important to monitor the situation in Norway through sampling and analysis.

The EU is introducing new legislation to prevent the import of illegally harvested timber, which will enter into force in 2013. It is likely to be incorporated into the Agreement on the European Economic Area, and will in that case apply in Norway as well. The rules require operators to be able to document that timber and timber products that are to be marketed in the EU have been legally harvested.

- 4.10. Substantial adverse impacts on biological or landscape diversity in connection with the import and release of alien organisms will be avoided. Eradication, containment or control measures will be initiated or implemented for particularly invasive alien organisms that are already established in the Norwegian environment.
- 4.11. Genetically modified organisms that are deliberately released, cf the Gene Technology Act, will not have adverse impacts on biodiversity.



# Spectacular mountain landscapes

Norwegians love their mountains – at all times of year, and whatever the weather. The trouble is that such boundless affection can in itself be a threat to the harsh environment, which paradoxically is also very vulnerable.

The clear crisp air. A breeze ruffling your hair. A wide panorama, peaks and ridges stretching as far as the eye can see. Rugged ground softened by the growth of lichen, moss, heather and willow scrub. A tiny lemming that bounces out from behind a rock, spluttering with rage. These are the Norwegian mountains, the realm of the wild reindeer. You can enjoy the peace of an undisturbed wilderness, listen to the sounds of the wild and enjoy the sight of plants and animals that you will not find anywhere else. Many of Norway's mountain ranges are rugged and dramatic, with precipitous cliffs, deep valleys and glaciers. In these spectacular

landscapes you can feel very small and insignificant, but also at one with nature. The mountains and fjords are the main attractions for many visitors to Norway.

Mountain plants and animals are adapted to extreme conditions, and it does not take much to disturb the delicate balance that has developed over thousands of years. Conditions are so difficult that fewer species can survive in the mountains than in the lowlands, but the numbers of each species are often high.

People have always used the mountains, and have left many traces behind them, from ancient pitfall trapping systems to old summer farms and abandoned mines.

Traditionally, the most important activities were hunting, trapping, fishing and other forms of harvesting. These are still the basis for local commercial activities today.

The tradition of outdoor recreation in the mountains is a more modern development, which is creating more activity and employment in many rural municipalities. In fact, in many mountain communities, tourism is the sector that generates the most income. The sector includes the use of nature and the cultural heritage by travel and tourism companies and diversification by farmers into tourism-related activities. However, more intensive use of mountain habitats may have adverse effects on



A magnificent view from Stetind in the Jotunheimen mountains, looking across to the Smørstabb massif.

©Kim Abel/Naturarkivet.no

biodiversity, and sound management is therefore essential to ensure that we use these areas sustainably.

### Reindeer, ravens and ptarmigan in the domain of the wolverine

Mountains, defined as areas higher than or north of the current treeline, cover about 30 % of mainland Norway. This does not include the area of rivers and lakes in the mountains. In most parts of Norway, mountain birch (*Betula pubescens* ssp. *tortuosa*) is the tree species that grows highest in the mountains and forms the treeline. Norway has more than 1600 glaciers, and steep fjords and valleys cut through the mountain ranges, adding to the beauty of the landscape.

Mountain animals and plants live under extreme conditions. Wind, ice, snow, wide temperature variations, very dry or wet soils, frost action and the calcium content of soil and bedrock all affect plants and animals. To cope with the extremes, many organisms have evolved into specialists. For example, a number of rare mountain plants have very narrow temperature tolerances or require soil with a high calcium content. The availability of food is a key survival factor for many mammals and birds. Because they are adapted to extreme conditions, many mountain species are very vulnerable to any additional pressure – they are already living close to their tolerance limits.

The mountain vegetation is dominated by shrubs, grasses and sedges, mosses and lichens, with a wider variety of non-woody plants where the soil is rich in lime. The depth and distribution of snow cover determines vegetation pattern on a smaller scale. There are very marked differences between wind-blown ridges where little snow lies and snowbeds, where snow cover may persist until well into July and new snow can begin to accumulate again in September or October. Plants that grow in snowbeds must respond quickly and have an effective life cycle, so that they have time to flower and set seed before the snow returns.

The insect fauna in the mountains

## Variable Nature Index values in mountain areas

According to the Nature Index, the overall state of biodiversity in the mountains is good (0.69), but poorer in certain areas in the southern half of the country (0.42).

is dominated by flies, wasps, beetles and butterflies. Typical mountain birds include golden plover (*Pluvialis apricaria*), snow bunting (*Plectrophenax nivalis*), wheatear (*Oenanthe oenanthe*) and the raven (*Corvus corax*), whose characteristic croaking calls make it easy to spot. Hunters tend to dream of finding a flock of ptarmigan (*Lagopus muta*).

Of the threatened and near-threatened species on the 2010 Norwegian Red List, 158 are associated with the mountains. Plants include the locoweed (*Oxytropis deflexa* ssp. *norvegica*), the grass *Poa lindebergii*, spiked speedwell (*Veronica spicata*) and upright lousewort (*Pedicularis flammea*). Great snipe (*Gallinago media*) and snowy owl (*Bubo scandiacus*) are two of the red-listed bird species, and mammals include Arctic fox (*Vulpes lagopus*) and wolverine (*Gulo gulo*). The wild reindeer (*Rangifer tarandus*) is not a threatened species, but Norway has a special international responsibility for its management.

Through its evolutionary history, the wild reindeer has become adapted to the harsh conditions found in the mountains, especially in winter. Two or three hundred years ago, wild reindeer were found in all mountainous parts of the country, and it was still abundant in North Norway around 1800. Today, the mountains in the southern half of Norway are the only place in Europe where wild reindeer are still to be found. There are 23 more or less separate populations.

According to official figures for 2010–11, the area used (not exclusively) for reindeer husbandry in Norway totalled 146 000 square kilometres in 139 different municipalities. This corresponds to nearly half of Norway's land area. More than 90 % of

## National targets

### – Spectacular mountain landscapes

- 5.1. The extinction of threatened mountain species will be halted and the status of declining species will be improved by 2020.
- 5.2. The diversity of mountain habitat types will be maintained or restored within their natural range, so that there are viable populations of all species. Genetic diversity and important ecological functions and services will be maintained.
- 5.3. Management of all harvested stocks of mountain animals and plants will be ecosystem-based, and they will be harvested sustainably, so that they are found in viable populations in their natural ranges by 2020.
- 5.4. Viable populations of wild reindeer will be maintained within the natural range of the species in the southern half of Norway.
- 5.5. There will be 39 litters of wolverine a year.
- 5.6. The most seriously threatened mountain habitat types will be classified as selected habitat types.
- 5.7. The most seriously threatened mountain species will be classified as priority species.
- 5.8. A representative selection of mountain habitat types will be protected for future generations.
- 5.9. The conservation value of protected areas will be maintained or restored.
- 5.10. Substantial adverse impacts on biological or landscape diversity in connection with the import and release of alien organisms will be avoided. Eradication, containment or control measures will be initiated or implemented for particularly invasive alien organisms that are already established in the Norwegian environment.

this is within the area where the Reindeer Husbandry Act, on the basis of immemorial rights, grants the Sami population special rights to graze reindeer (the three counties of North Norway and parts of Central Norway).

### Wild reindeer are adapted to extreme cold

Wild reindeer can cope with temperatures down to 30–40 °C below zero without needing to raise their metabolic rate to keep warm. Their two most important adaptations to cold are fur covering the entire body – even the muzzle – and the thickness and insulating properties of the fur. The outer layer of guard hairs is very dense – three times as many hairs per square centimetre as in moose and red deer – and each hair has an insulating air-filled cavity.

The Norway lemming (*Lemmus lemmus*) is the most characteristic of our small rodents. Many walkers in the mountains have come to a astonished halt as a tiny animal blocks the path right in front of them, bouncing up and down and hissing and squeaking aggressively. In a lemming year, when the population peaks, they are everywhere in huge numbers.

So far, no priority species or selected habitat types are associated with high-mountain areas.

### People put pressure on the mountain environment

In the past 50 years, human activities have been putting more and more pressure on mountain areas in Norway. Roads have been constructed, holiday cabins and



apartments have been built, and hydro-power developments have changed many areas. This has negative impacts. For example, the migration patterns of wild reindeer can be disrupted by a road that cuts across their migration path or cabins that block their route.

Regional management plans for the wild reindeer areas are being drawn up, with priority being given to those that have been designated as national conservation areas for reindeer. The plans are being drawn up in cooperation between the relevant counties. They divide the wild reindeer areas into different zones for planning purposes.

Few people have ever lived permanently in the mountains, but large areas have been influenced by summer livestock grazing. Transhumance used to be commonly practised in Norway – in 1850, there were about 50 000 summer farms in Norway. By 2008, only 1 237 of them were still in use. As a result, semi-natural vegetation types are declining rapidly in many areas, whereas other areas are overgrazed. The ecological effects of livestock grazing vary depending on the species and the number of animals. In addition, there is now far less felling and haymaking in areas near the treeline. As a result of these changes, trees are once more encroaching on these areas. In the long run, they will develop into forest dominated by mountain birch, willow (*Salix*) scrub and other woody plants.

In addition, climate change will bring higher temperatures and a longer growing season. This is expected to have major impacts on species that are adapted to a mountain environment, and result in changes in species distribution.





The environment in Svalbard is largely undisturbed, but there are nevertheless many traces of human activity – left by research expeditions, hunters and trappers, miners and explorers. Nevertheless, almost all of Svalbard (98 % of the area) is defined as wilderness-like, meaning that it is at least 5 km from major infrastructure development such as roads and power lines. And 65 % of the land area of the archipelago is protected as nature reserves and national parks. Their management is therefore very important for the state of the mountain and tundra ecosystems. The Svalbard environment is highly vulnerable, and pressure from tourism, outdoor recreation and research is increasing. Motor traffic on land causes noise pollution that may disturb the fauna, generates air pollution and leaves tracks that persist for a very long time, and is

## Arctic fox

A number of steps have been taken to try to ensure the survival of the Arctic fox in mainland Norway. In 2011, at least 270 cubs were born on the mainland, almost half of them to foxes released by the Arctic fox breeding programme. The 2010 Norwegian Red List classifies the species as critically endangered in mainland Norway (it is not threatened in Svalbard), and only time will show whether it is possible to maintain a viable population permanently.

therefore strictly regulated.

There are also many protected mountain areas in mainland Norway. About 75 % of the total area of national parks is in the mountains, and the corresponding figures for protected landscapes and nature reserves are 71 % and 22 % respectively. The Government is currently finalising the national park plan, which will protect the most valuable areas of Norway for future generations. When it is complete, about 27 % of all mountain areas will be protected under the Nature Diversity Act.

Management of the national parks was previously a central government responsibility, but is now being delegated to the local level, and local management boards are being set up. They are responsible for maintaining the conservation value of these areas, on the basis of the national park management plans. Outside the protected areas, the Planning and Building Act is the most important instrument for maintaining the value of the natural environment and landscape in the mountains. For example, it requires a municipality that is planning to permit cabins to be built in an area in the mountains to take into consideration factors such as their location in relation to migration routes for wild reindeer.

The Norwegian Nature Inspectorate plays an important role in safeguarding species and habitats in the mountains, both within and outside protected areas. Staff

provide advice and information and ensure compliance with environmental legislation. In some mountain areas, paths are constructed to channel visitor traffic away from the most vulnerable areas. It is also important to make people more aware of the vulnerability of mountain ecosystems and provide information about the habitats and species they will find there and threats to the mountain environment. This is done through visitor information centres, signs and information material.

- 5.11. Municipal, county and regional planning will help to prevent undesirable development in mountain areas.
- 5.12. The current extent of wilderness-like areas in Svalbard will be retained, biological and landscape diversity will be maintained virtually untouched by local human activity, and the value of protected areas as reference areas for research will be safeguarded.
- 5.13. Transport and travel in Svalbard will not cause serious or permanent damage to the vegetation or disturb animal life. It will be possible to enjoy the natural environment undisturbed by motor traffic and noise even in areas that are easily accessible from the settlements.



# A valuable cultural heritage

Rock art created 9 000 years ago. A ski jump from 1950. Fens and bogs that were being used for haymaking before the Black Death reached Norway. A red phone box. They are all part of our cultural heritage. Which of them should we protect for posterity?

For more than 12 000 years, people have been living in what is now Norway and leaving physical evidence of their activities behind them. This enables us to piece together how human society has changed and developed since people arrived in Norway. Traces of our history can be found everywhere – in our towns, in our forests, in the mountains, along the coast and even on the seabed. But the cultural heritage does more than tell our history – it is also part of a dynamic contemporary environment. And like species and habitats, the cultural heritage

is vulnerable. Once historical buildings or rock art, hay meadows or burial mounds are destroyed or removed, they are lost for ever.

All our landscapes, from the most densely populated urban areas to apparently undisturbed mountain and forest, bear traces of human occupation. In towns and built-up areas, buildings are the most conspicuous elements of the cultural heritage. Every building has a story to tell about the people who built it and those who lived there or used it. The cultural heritage brings our history to

life. Seeing a real Viking ship or an actual burial mound is quite different from reading about them or looking at images on a screen.

## Half of Norway protected? Not even one per cent

Historical buildings, urban environments, archaeological remains and agricultural landscapes – all these structures and sites are an important part of our common memory. We are still discovering valuable structures and sites all over Norway. Not everything can be preserved, so we must



Ormelid farm in Sogn og Fjordane county.

Photo: Hans Olav Stegarud

© Directorate for Cultural Heritage

decide which elements are most valuable and ensure that they can still be enjoyed by future generations.

At present, we do not have a good enough overview of which structures and sites are most valuable. We know too little about their condition, and information on which of them have been lost is incomplete. Archaeological remains on or below the surface of the soil or under water are often the only source of information on Norway's earliest history, and they are automatically protected under the Cultural Heritage Act. But we know too

little about the whereabouts of archaeological remains.

For every archaeological site or structure registered, there may be 20 that are unknown. By August 2011, about 250 000 archaeological finds had been made at about 121 000 different sites in Norway.

Archaeological monuments and sites include rock art – prehistoric symbols and pictures carved, engraved or painted on natural rock. Norway's rock art may have been created up to 9 000 years ago. There are rock art sites in all parts of the country – more than 1700 sites have been registered, with a total of about 31 000 images. The rock drawings of Alta in the far north of Norway are on the UNESCO World Heritage List.

Six other sites in Norway are also on the World Heritage List. This means that they are considered to be of outstanding universal value, and Norway has a special responsibility for safeguarding them. The other sites are Bryggen (the old wharf in Bergen), Røros mining town, the Struve geodetic arc, the Vega archipelago, the West Norwegian fjords Geirangerfjord and Nærøfjord, and Urnes stave church.

In the Middle Ages, Norway had between 1000 and 2000 stave churches. These are built entirely of wood, with cylindrical columns and a shingled roof, and were once to be found in other parts of Northern Europe as well. Today there are only 28 left. In addition, there are just over 200 secular medieval wooden buildings still standing. Many of them are dwellings and storehouses from old farms, and the oldest of them date back to the 1200s. All buildings dating from before AD 1537 are automatically protected under the Cultural Heritage Act, and individual protection orders can be issued for more recent buildings. The Directorate for Cultural Heritage is responsible for monitoring the state of repair of historical buildings, and all of the medieval buildings were restored during the 1990s. Boats and ships are also an important part of Norway's cultural heritage: 207 vessels are considered to be of historical importance, and protection orders have been issued for nine of these.

## Birthplace of Norway's brown cheese protected

The Directorate for Cultural Heritage issued a protection order for the summer farm Solbråsetra in Oppland county in summer 2011. Transhumance used to be a vital part of the annual agricultural cycle in Norway. The buildings at Solbråsetra are historically important in themselves, but are even more valuable as part of an entire summer farm with the old pastures, and as an illustration of the old way of life. Solbråsetra is also considered to be the birthplace of Norway's characteristic sweet brown whey cheese. In summer 1863, one of the dairymaids here is said to have added cream to the whey, producing a much richer cheese. The combination of the buildings, the landscape and its history give Solbråsetra a value that cannot be measured in monetary terms.

## Hayfields need active management

The cultural landscape includes areas that are intensively farmed, pasture and grazing land, and coastal heaths. These are semi-natural habitats that are completely dependent on continued human activity if they are to survive. But the prospects are not bright. According to the Norwegian Nature Index, the state of biodiversity in Norway's major ecosystems is poorest for open lowland landscapes and forests. It is difficult and perhaps impossible to prevent such habitats from becoming overgrown with trees and shrubs. In addition, many areas are threatened by development.

Many habitat types in the cultural landscape are very rich in species, including rare animals and plants. Up to 50 different plant species per square metre may sound like a description of the Amazonian rain forest, but this kind of species diversity has been found in Norwegian hay meadows. They are an excellent example of the fact that it is not always enough give a habitat type legal protection if we want to preserve it for future generations. Hay meadow must be used. If they are not mown, they gradually cease to be hay meadows, and lose their special character and rich plant and animal life.

## National targets

### – A valuable cultural heritage

- 6.1. Annual losses of cultural monuments, sites and environments will by 2020 not exceed 0.5 % of the total.
- 6.2. Annual losses of archaeological monuments and sites that are automatically protected under the Cultural Heritage Act will by 2020 not exceed 0.5% of the total.
- 6.3. A representative selection of cultural monuments, sites and environments will be protected by individual protection orders by 2020.
- 6.4. A standard of repair where only normal maintenance is required will be achieved for protected buildings, installations and vessels by 2020.
- 6.5. A representative selection of archaeological monuments and sites that are automatically protected under the Cultural Heritage Act will be safeguarded by 2020.
- 6.6. The extinction of threatened species associated with cultural landscapes will be halted and the status of declining species will be improved by 2020.
- 6.7. The diversity of habitat types in cultural landscapes will be maintained or restored within their natural range, so that there are viable populations of all species. Genetic diversity and important ecological functions and services will be maintained.
- 6.8. All agricultural areas will be sustainably managed by 2020.
- 6.9. The most seriously threatened habitat types in cultural landscapes will be classified as selected habitat types.
- 6.10. The most seriously threatened species associated with the cultural landscape will be classified as priority species.
- 6.11. A representative selection of habitat types in the cultural landscape will be protected for future generations.

Many threatened species are associated with the cultural landscape. They include black vanilla orchid (*Nigritella nigra*), mountain arnica (*Arnica montana*), hermit beetle (*Osmoderma eremita*), corncrake (*Crex crex*), black-tailed godwit (*Limosa limosa*) and skylark (*Alauda arvensis*). The diversity of both species and habitats and the combination of nature and human influence is also an important part of the Norwegian identity – what Norwegians often think of as quintessentially Norwegian, and part of what tourists come here to see. The cultural landscape is valuable in so many ways – in biological, historical, aesthetic and economic terms.

Farm buildings and archaeological remains in and around farms also form part of the cultural landscape. Some are relatively recent, others ancient. In 2011, a farm called Ormelid in Sogn og Fjordane received protection. This area has been farmed continuously for 4 000 years, and there is a wealth of structures and semi-natural habitat types around today's farm buildings. They can tell us a great deal about farming techniques and how they have changed during the farm's long history, and about how living conditions have changed for its inhabitants.

All elements of the Sami cultural heritage that are more than 100 years old are automatically protected under the Cultural Heritage Act. So far, only a small proportion of Sami buildings have been registered, so there is no complete overview of which of them are automatically protected or their condition. Systematic mapping of automatically protected Sami buildings and their condition started in 2011.

### Working to protect our heritage

Our landscapes and cultural monuments and sites are under constant pressure – from structural changes in agriculture and other sectors, changing settlement patterns and lifestyles, depopulation of rural areas, construction and development. Cultural landscapes are lost when



farmland is used for other purposes, and climate change is a new and growing threat. A changing climate can sometimes bring surprises too. In summer 2011, archaeologists found evidence that a thousand years ago, people were living in what is now Breheimen national park – at 1900 metres above sea level. Shoes, textiles, hunting equipment and other remains lay hidden under snow and ice for hundreds of years until a warmer climate caused the ice to retreat, revealing new traces of our history.

In all, roughly 6 000, or 0.1 %, of all Norway's historical buildings are protected. Of these, 3 393 are in private ownership. A survey in 2006 showed that the condition of many of them was deteriorating. Since then, more funding has been made available and a number of restoration and maintenance projects have improved the situation. Guidelines are now being drawn up for maintaining historical buildings once a satisfactory standard of repair has been achieved. In addition, eight cultural environments – areas where buildings and other structures and their surroundings form an integrated whole – have been protected under the Cultural Heritage Act. They range from the Birkelunden area of central Oslo and the old silver mines and their surroundings in Kongsberg to the historical summer settlement of the Skolt Sami in Neiden in Finnmark. The Ministry of the Environment is preparing a white paper on Norway's overall cultural heritage

### Heritage Here

This is a recently started project to give people easy mobile access to digital information and stories about where they live or places they visit. All you need to do is download an app to gain access to information on history, buildings and nature, tailored to your location. The system is being tested in three pilot locations.

## Black-tailed godwit and hermit beetle – priority species

The black-tailed godwit and the hermit beetle are both threatened species that are associated with the cultural landscape, and both were designated as priority species under the Nature Diversity Act in May 2011. There are two subspecies of black-tailed godwit in Norway, one of which nests in farmland, while the other prefers natural wetlands. The subspecies that prefers farmland has found suitable nesting sites in the Jæren area near Stavanger. Changes in agricultural techniques such as earlier mowing of grassland, cultivation of natural meadow and drainage of wet meadows are threats to the species on its breeding grounds. The hermit beetle is one of Norway's largest beetles. It lives in old hollow broad-leaved trees, which are often a characteristic part of the cultural landscape. It has only been recorded from one site in Norway, a churchyard in the town of Tønsberg. It was rediscovered there in 2008 – the first record for over 100 years. The main threat to the hermit beetle is loss of habitat as the number and quality of old hollow trees declines.

policy. Norway's world heritage policy is also being considered. The Ministry of the Environment is working with other ministries to establish a permanent national pilgrim centre in Trondheim, where Nidaros cathedral is the destination for pilgrim routes in Norway.

To counteract some of the threats to the cultural landscape, Norway has been seeking to reduce annual losses of farmland. In 2004, a national target was set of halving conversion of soil resources for purposes other than agriculture by 2010. In the period 1994–2003, the average rate of loss was 1 400 hectares a year, and the aim was to reduce this to 570 hectares. According to official statistics, 669 hectares of cultivated land was converted to other uses in 2010. This is 20 % less than in 2009 and the lowest



Borrehaugen, a Viking burial mound in Vestfold. Photo: Lisen Roll © Directorate for Cultural Heritage

figure recorded since 1980. More than two thirds of all farmland lost is used for housing, commercial activities and transport purposes. The Planning and Building Act is an important tool for safeguarding the cultural landscape and for conservation of soil resources. The agricultural, environmental and cultural heritage authorities are working together to safeguard and restore valuable cultural landscapes and our archaeological and architectural heritage. Targeted measures have been implemented in 22 particularly valuable cultural landscapes that were selected by the agricultural and environmental authorities, and in two of Norway's World Heritage sites, the West Norwegian Fjords (Geirangerfjord and Nærøysfjord) and the Vega Archipelago.

In some cases, the best way of safeguarding threatened species and habitats is to designate them as priority species or selected habitat types under the Nature Diversity Act. Hay meadows and mires traditionally used for haymaking, which are some of Norway's most species-rich habitats, were included in the first list of selected habitat types. As this work continues, more species and habitat types associated with the cultural landscape may be considered. Some alien species can spread rapidly in a cultural landscape that is no longer actively managed. Regional action plans are being drawn up to combat invasive alien species. Some of these will be completed in 2012, and will give priority to action in protected areas. Action plans for two alien species, narrow-leaved ragwort (*Senecio inaequidens*) and Japanese rose (*Rosa rugosa*), are also being prepared.

Environmental policy instruments in

the agricultural sector are an important means of ensuring satisfactory management of the most valuable areas of the cultural landscape. These instruments need to be better targeted. According to the 2011 Agricultural Agreement between the state and the farmers, a working group is to look at the reporting system for agricultural goals and instruments.

- 6.12. The conservation value of protected areas will be maintained or restored.
- 6.13. Substantial adverse impacts on biological or landscape diversity in connection with the import and release of alien organisms will be avoided. Eradication, containment or control measures will be initiated or implemented for particularly invasive alien organisms that are already established in the Norwegian environment.
- 6.14. The release of genetically modified organisms, of the Gene Technology Act, will not have adverse impacts on biodiversity.
- 6.15. Municipal, county and regional planning will help to prevent undesirable losses of agricultural areas and safeguard important elements of the cultural heritage.
- 6.16. A representative selection of structures and sites belonging to the cultural heritage of Svalbard will be preserved as scientific source material and as a source of emotional and aesthetic experience for future generations. Losses of such structures and sites as a result of human activity will not exceed an average of 0.1 % of the total per year.



# A good urban environment

Even in Norway, with its small population and plenty of space, most people live in built-up areas. On the other hand, no one lives far from the countryside. Towns depend on the natural environment to function properly.

For many people, a good life means the smell of fresh coffee from the next-door café, a convenient greengrocer's shop on the corner and a lively variety of neighbours. Norwegians are lucky enough to be able to combine this with easy access to fjord and forest.

About 80 % of Norway's population lives in towns and built-up areas – so for most of us, a good urban environment is important for health and well-being. And although there are always some people who go against the tide, more and more people are moving to urban areas and have been doing so ever since the Second World War. People want to live near work-

places, theatres, cinemas, museums and shops, while at the same time being able to go for a country walk or an afternoon's skiing straight from their front door. And they don't want to be dependent on a car for everyday activities.

There are now more than 900 towns and built-up areas in Norway, ranging from Oslo with a population of almost 600 000 to settlements with only about 200 inhabitants. But even in the largest towns, everyone has easy access to attractive outdoor recreation areas all year round. You can start the day with a cycle ride in the countryside and end it at the cinema, a concert or a café. This is impossible in

many parts of the world, because urban sprawl means that rural areas are out of reach. Norwegians realise that they are privileged, and enjoy being able to live a life with a variety of options for education, work and leisure activities, combined with plenty of opportunities for outdoor recreation. Do you prefer canoeing or sitting in a café? Picking bilberries or watching a film? In Norway, there is no need to choose.

## Effective land-use and sustainable transport

Growing numbers of people make it more difficult to maintain the quality of the



environment in and around towns. Green spaces may be lost as infrastructure is developed to cope with the rising volume of traffic. There tends to be less space and more queues and noise, and emissions of particulate matter and greenhouse gases rise. In recent years, there has been a concerted effort to improve the situation through urban renewal and by diverting heavy traffic away from town centres and residential areas, reducing industrial pollution and introducing a variety of environmental improvements.

Greenhouse gas emissions in Norway's 13 largest towns rose by 5 % from 1991 to 2008, then dropped in 2009 but rose again in 2010. These figures only include emissions that the towns can control themselves. Road traffic accounts for about 60 % of these emissions. Emissions from stationary sources, particularly heating, account for a further 20 %, about 10 % comes from landfills, and the remainder from a variety of sources. Road traffic is also the most important source of NO<sub>2</sub> emissions and a major source of particulate matter, and emissions of these pollutants are still too high in some Norwegian towns.

Compact urban development patterns are needed to make it possible to provide efficient public transport and encourage more people to walk and cycle. Promoting compact urban development is therefore also sound climate policy. However, densification and urban renewal are more challenging tasks than greenfield development. In 2009, Norway adopted a new Planning and Building Act, which includes tools that make it easier to promote densification.

The 13 largest towns in Norway are now growing largely through densification and urban renewal. Statistics show that transport becomes greener as population density rises. The pattern of development in smaller towns and settlements is generally less compact. Fewer people use sustainable modes of transport, both because public transport is poorer and because fewer people cycle or walk.

Norway adopted national policy

## Sound principles of sustainable urban development:

- Public transport should form the backbone of the urban structure and govern development patterns.
- There should be a strong centre with a concentration of workplaces, housing and retail and office functions.
- Commercial and residential developments should be concentrated around public transport nodes.
- There should be local communities with dense and varied residential districts, green spaces, schools, day care centres and retail and commercial activities.
- There should be a continuous green structure with green corridors that link urban districts and green spaces with the surrounding countryside.
- There should be a network of main cycle routes that make cycling an attractive transport option.
- The main road system should not pass through local communities, but should serve urban centres and public transport nodes.

guidelines for coordinated land-use and transport planning almost 20 years ago. Local and regional authorities must use the guidelines as a basis for their planning, and this is particularly important in and around towns. For example, a regional strategy has been developed for Oslo and the surrounding county of Akershus. The work was headed by the Ministry of the Environment. Coordinated land-use and transport plans and reviews of ways of promoting more sustainable transport have also been drawn up for the other larger urban areas of Norway. The 13 largest towns are taking part in the Cities of the Future programme. They are assessing the use of road pricing and restrictions on parking combined with the expansion of public transport and networks of cycle paths.

Many of Norway's towns have grown up in the areas with the best agricultural soils, and biodiversity is generally highest in these areas, which are also most

## National target

### – A good urban environment

- 7.1. Municipal, county and regional planning will help to ensure that towns and urban areas are sustainable, attractive and conform to the principles of functional design, with a physical environment that promotes health and a good quality of life.

productive in biological terms. The Oslo region has more threatened species than any other part of the country, and also the highest population density. The most heavily used outdoor recreation areas are near towns. All these factors make it important to prevent uncontrolled urban sprawl and to use areas that are suitable for development as effectively as possible. Farmland, the presence of threatened species or habitat types, and other areas that are valuable for biodiversity are all taken into account in Norway's planning procedures. The Government has also taken steps to strengthen conservation of soil resources. Forests and other recreational areas near a number of towns have been safeguarded through planning decisions or – as in the case of the extensive forest areas around Oslo – by special legislation.

#### Planning where services for the public are located

The position of urban settlement centres and other public transport nodes needs to be strengthened. At present, the number of residents and workplaces in town centres is rising slowly, but retailing is losing ground. From 2003 to 2009, total retail turnover in the centers of the largest towns dropped by 5–6 %, only remaining stable in Oslo. This is partly because of the tendency to site shopping centres and other services on the outskirts of towns or outside them. The Government is seeking to counteract this trend, and in 2008 adopted regulations restricting the establishment of shopping centres outside settlement centres. The aim is to reduce dependency on private cars and strengthen urban centres.

In some cases, hospitals, colleges and other state-run services for the



general public are sited in areas that are poorly served by public transport, often outside or on the outskirts of towns and urban settlements. This does not promote sustainable development.

#### Cities of the Future are on their way

The Ministry of the Environment initiated the Cities of the Future programme in 2008. It involves cooperation between the 13 largest towns in Norway, the Norwegian Association of Local and Regional Authorities, four ministries and the business sector. The main objective is to reduce greenhouse gas emissions from road transport, stationary energy use, consumption and waste in the largest urban areas. Climate change adaptation strategies are also to be developed. In addition, the programme is intended to provide a better urban environment, which will improve public health, promote commercial activities and make towns more attractive places to live in.

In 2009, the Ministry of the Environment, in cooperation with Statsbygg (the agency responsible for public construction and property management), therefore published a set of good examples showing how public services can be sited to promote sustainable urban and community development.

#### Urban spaces, green structure and biodiversity

An attractive, functional urban environment is important for well-being and



## More nature in towns than you might think: priority species in our immediate surroundings

The counties with the largest numbers of threatened species are Oslo, Akershus, Vestfold, Telemark, Østfold and Buskerud. About 40 % of all Norwegians live in this region, which also provides suitable conditions for species that require a relatively warm climate. Many species and habitat types here are not found anywhere else in the country. Two plants, northern dragon's head (*Dracocephalum ruyschiana*) and red helleborine (*Cephalanthera rubra*), and the hermit beetle (*Osmoderma eremita*) are examples of species that find suitable habitats in and near densely populated areas. They were all designated as priority species under the Nature Diversity Act in May 2011 .



public health. Easy access to frequently needed services, clean air, and safe and welcoming surroundings are all important to town-dwellers. Qualities such as these also encourage people to spend more time outside, which is particularly important in a country like Norway, where it is dark and cold for much of the year.

It is also important to retain the variety of habitats that support biodiversity in and around urban settlements. It is not only the surrounding rural areas that are important – green spaces within towns, groups of trees, old trees, parks and rivers are all vital habitats for many different plants and animals.

Many towns are changing “from the inside out”, for example as industries move away from town centres and other activities take over. This means that we have to find good solutions for urban renewal, with a mixture of old and new buildings and access to shops and services that people need every day.

The new Planning and Building Act highlights the importance of the quality of outdoor areas and sustainable urban design. The interests of children and young people have been given a more prominent place in planning processes. Near housing, there must be adequate opportunities for safe access and play and other activities in a varied and continuous green structure, and ready access to surrounding rural areas.

Official statistics show that in 2009, 67 % of the population in the largest towns lived less than 200 metres from play and recreational areas, 2 % less than in 2004. The proportion living less than 500 metres from larger outdoor recreation areas remained constant at 64 %. There is no clear relationship between the population density in a town and access to recreation areas.

Access to the shoreline, rivers and lakes has generally improved, and many towns have developed attractive urban spaces.

In Oslo, a major project is under way in the Groruddalen area, which includes the eastern districts of Oslo, with a population of more than 100 000. One of the main challenges is to reduce the environmental problems and the barrier effects of the busy main roads and railway that run through the area. The long-term objectives are sustainable urban development, clear environmental improvements, and improvements in the quality of life and living conditions for residents of the area. The Government and the City of Oslo have entered into a cooperation agreement for the period 2007–16, and are providing half the necessary funding each (a total of NOK 100 million a year).



# The great outdoors

That wonderful sense of achievement when you reach the top of the mountain. The thrill of finding your own private lake. Norwegians are outdoor enthusiasts, and can still light a fire with only one match or find their way through the wilderness.

Fishing from a rocky shoreline? Head over heels in deep powder? Perhaps you prefer to glide silently across the still water of a sheltered fjord in a kayak. Or you might enjoy that Norwegian classic, a sunny Easter in the snow-covered mountains, where old coarse-grained snow and the warmth of the sun show that spring is approaching. The satisfaction of seeing that the summit is closer every time you take a rest. Pushing yourself to go faster, and feeling your legs and heart respond. Or quieter pleasures: wandering along the shore looking for

shells with your four-year-old. An evening swim in the last of the sunshine. Running on the springy forest floor in a light shower of rain. Cycling with your dog. And then there is the anticipation. What will this year's cloudberry season be like, and will there be any in our secret spot this year? Will we manage to catch a trout where we could see them rising last year but couldn't get a bite?

Outdoor recreation is all of this – all the different activities people enjoy in the countryside, whether alone or with other people. There is always something for

both young and old. It may be quiet and reflective or strenuous enough to exhaust the fittest. Whatever we choose, it gives us peace of mind and a sense of physical achievement, from the pride of the five-year-old who has managed to come down the slope on skis for the first time without help, to the satisfaction of challenging yourself to dive from the same height as last year – and succeeding.

An active outdoor life makes people happier and healthier. Norway has a small population and plenty of space. Opportunities to enjoy the outdoors



are very important to Norwegians, and there are very generous access rights to the countryside – you can walk and ski, put up a tent for the night and swim and canoe in lakes and rivers, or pick berries and mushrooms, almost everywhere except on cultivated farmland. Green spaces and countryside close to people's homes are particularly important, because they are the setting for most of our everyday physical activity. And people who have an opportunity to get out and enjoy the countryside are more likely to appreciate the

importance of safeguarding the natural environment.

To widen access to the outdoors even more, the state also purchases land and concludes agreements with owners so that more areas can be set aside for outdoor recreation.

### Something for everyone

Nature is a source of enjoyment and contributes to the Norwegian sense of identity. Surveys have shown that about two thirds of Norwegians would like take part in outdoor activities more often, both close to their homes and further afield. Enjoying the peace and quiet and the unspoilt nature are the most important reasons given for visiting the countryside. Many of the outdoor activities that are popular in Norway are nature-based and give people experiences that will live long in their memories.

As more and more people move to towns and built-up areas, green spaces and nearby countryside have become increasingly important as the setting for leisure activities, outdoor recreation, and opportunities to experience nature.

Being outdoors and taking part in outdoor activities is important for many Norwegians. Surveys show that the proportion of the population aged over 16 who participate in outdoor recreation has risen over the past 30 years. However, fewer and fewer young people are taking part in traditional activities such as hiking, fishing, berry-picking and cross country skiing. The expansion of newer activities such as mountain biking, back-country skiing and kiteboarding is not enough to counterbalance the decline in more traditional activities.

In 2009, a survey showed that only about half of young people (age 15–24 years) in Norway have heard of their access rights to the countryside, and people in this age group know less about their access rights than the rest of the population.

On the other hand, more children are taking part in outdoor recreation activities. This is important because

healthy habits established in childhood can last a lifetime.

Population density in towns and built-up areas in Norway is rising. This is consistent with Norway's goal of promoting compact urban development, which is also sound land-use, transport and climate policy. However, this trend also involves a risk that green spaces will be lost and access to play and recreation areas will become poorer.

In Norway, the use of motor vehicles off-road and motor boats in lakes and rivers is generally only permitted for essential purposes, for example in connection with public services and reindeer husbandry. Motor vehicles and boats can damage the terrain, cause noise pollution and disturb the fauna, and their use can result in conflict with outdoor recreation interests.

### Maintaining and strengthening access rights

Active use helps to maintain and strengthen access rights to the countryside. In some parts of the country, particularly most popular stretches of coastline such as much of the Oslofjord, there is constant pressure on access rights. Even though building in the 100-metre belt along the shoreline is generally prohibited, many exemptions are still being granted, for instance so that holiday homes can be built. Illegal privatisation is also a problem – for example, people may put up fences and build jetties, denying the public access to the shoreline. The authorities are therefore taking steps to improve access, for example by setting aside areas for outdoor recreation and extending trails along the coastline. The most popular areas in densely populated parts of the country are being given priority.

Traditional access rights in Norway were codified when the Outdoor Recreation Act was adopted in 1957. This is the most important piece of legislation for maintaining access rights and ensuring that everyone in Norway has opportunities for outdoor recreation.

## National targets

### – The great outdoors

- 8.1. Everyone will have the opportunity to take part in outdoor recreation as a healthy and environmentally sound leisure activity that provides a sense of well-being both in their local communities and further afield in the countryside.
- 8.2. Areas of value for outdoor recreation will be safeguarded and managed in a way that maintains the natural environment.
- 8.3. Access rights to uncultivated land will be maintained.
- 8.4. Municipal, county and regional planning will promote active outdoor recreation and create local communities that promote health and a sense of well-being and are environmentally sound.

In 2009, new legislation was adopted for “Marka”, the large areas of hills, lakes and forest around Oslo. These are the most intensively used outdoor recreation areas in Norway, and the new legislation is intended to encourage and provide opportunities for outdoor recreation, enjoyment of the natural environment and sport. Sound planning under the Planning and Building Act is also needed to achieve the objectives of the outdoor recreation legislation.

### Every outing brings health benefits

The Government is working actively to achieve the goal of ensuring that everyone has the opportunity to take part in outdoor recreation. One basic principle of its policy is that our own generation is responsible for ensuring that future generations have the same opportunities to enjoy the outdoors and unspoiled nature as we do ourselves.

As one step in developing an integrated outdoor recreation policy, the Government will draw up a national action plan for designated outdoor recreation areas for which the state provides financial assistance. This will provide guidelines for further work on state involvement in providing outdoor recreation areas and access routes. Strategies for encouraging more people to make use of the outdoors will also be developed.

There are now about 2 300 outdoor recreation areas in Norway that have either been purchased or are permanently safeguarded through agreements on their use. New areas are being added every year. In addition, long-distance trails are being established. Some of these are pilgrim ways, royal highways or other historically important routes. Coastal trails also provide better access to attractive areas along the shoreline. Reasonably-priced accommodation is often available along these routes. For example, a number of disused lighthouse buildings and cabins along the coastal routes have been opened to the public.



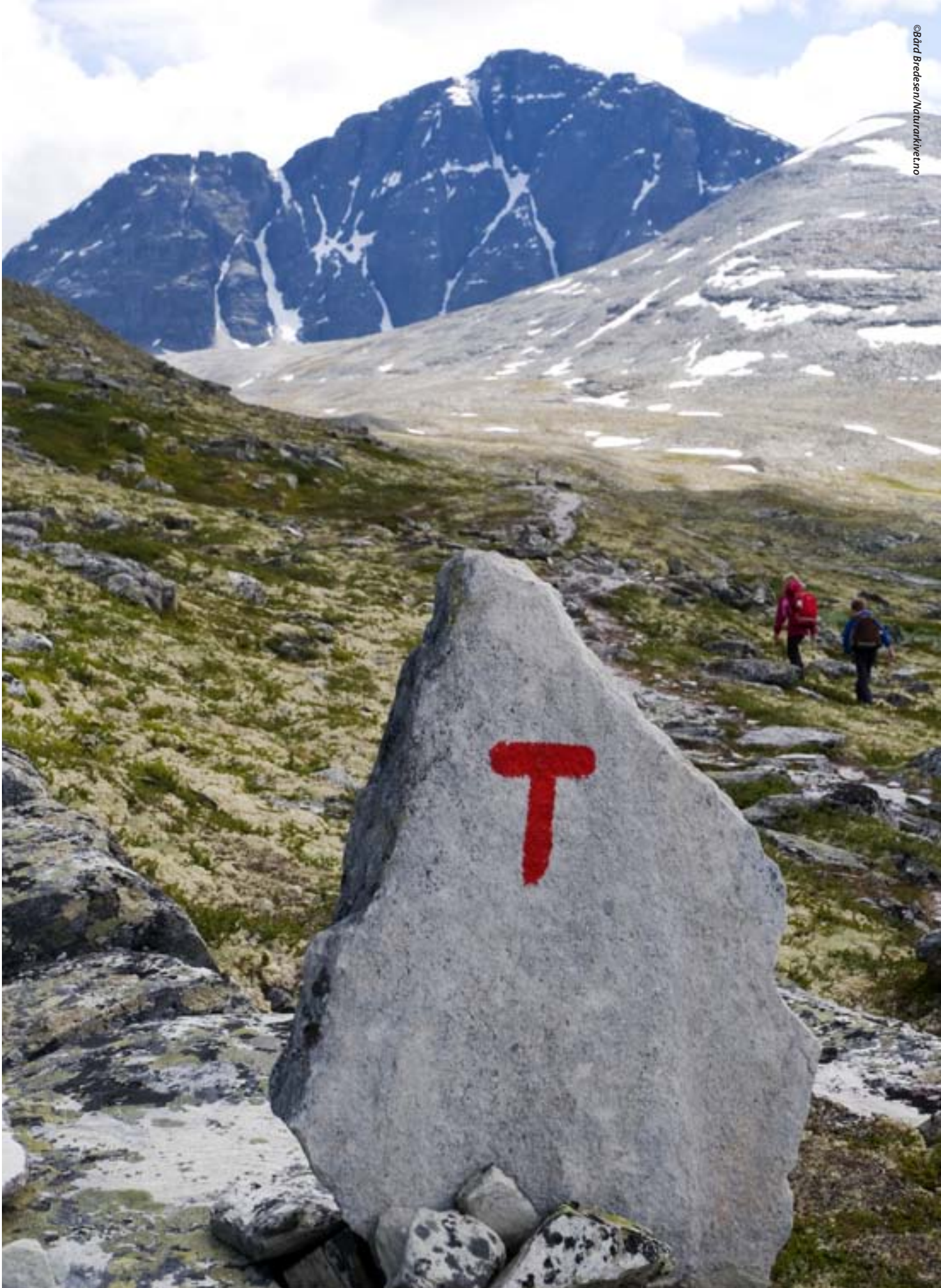
### More opportunities close to home

Areas close to towns are always under pressure, and active efforts are needed to retain already existing green spaces, footpaths and cycle paths, public parks and outdoor recreation areas. The Government’s aim is for there to be adequate opportunities for safe access and play and other activities near housing, schools and day care centres, and a varied and continuous green structure with ready access to surrounding areas of countryside. At the request of the Ministry of the Environment, the Directorate for Nature Management has started a programme to encourage more physical activity, especially by children and young people, and to safeguard more outdoor recreation areas near people’s homes.

The relevant public authorities at central and local level also work closely with voluntary outdoor recreation organisations. Municipal bodies are responsible for managing many outdoor recreation areas.

It is important to teach children and young people about activities that have little environmental impact as part of effort to encourage them to be more active out of doors, and to share Norwegian outdoor traditions with people from other cultural backgrounds. Various projects have been initiated in schools as part of the “environmental rucksack” project. Their aim is to develop children and young people’s enjoyment of and curiosity about their natural surroundings.

Snowmobile and other off-road motor traffic has increased in Norway, and if this trend continues, people will have less opportunity to enjoy the peace and quiet of unspoilt nature. Restrictions on the use of motor vehicles and motor boats must therefore be maintained to protect nature and human welfare.





# A non-toxic environment

We used to be able to see pollutants in the smoke from factory chimneys. Nowadays they are just as likely to exit through the gate as constituents of products. We need updated knowledge to deal with this new kind of pollution.

Everyone is entitled to an environment that promotes good health and welfare, and where biodiversity and productivity are maintained. And people do care about their environment, as shown by the strong public reaction when pollution was accidentally released into the Akerselva river in Oslo in winter 2011. Discoveries of toxic substances in products such as children's toys serve to raise public awareness of chemical hazards. Some substances are persistent and can be transported far afield in the atmosphere and with ocean currents,

polluting even the high Arctic.

We must take steps to ensure that in future, the products we use do not pose a threat to human health or the environment. The resources in waste must be recovered, and re-used wherever possible, and the environmental impact of waste disposal must be minimised. We must make sure that we have a clean and non-toxic environment in order to maintain a rich and varied fauna and flora and to ensure that we can continue to enjoy and harvest from our lakes and rivers, forests and mountains. Much of the value

creation and production in Norway is heavily dependent on a clean environment. We are also responsible for making sure that future generations do not inherit pollution problems that we have created.

Chemicals play a major role in improving our welfare and in important products and services, but there are many substances that pose an unacceptable risk to health or the environment. Some can cause cancer or allergies; others may disrupt reproduction, damage genetic material, or harm the immune or nervous systems. Persistent, bioaccumulative and



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toxic substances break down very slowly in the environment and accumulate along food chains. They are therefore a serious threat to biodiversity, food supplies and the health of future generations.

### PCB levels dropping

Environmental concentrations of some dangerous pollutants, for example PCBs, are dropping, showing that national and international bans on the use of chemicals or groups of chemicals that are known to be a serious threat do give results. Industrial releases of priority substances have been greatly reduced in Norway and all Western countries, and overall releases of persistent, bioaccumulative and toxic substances are considerably lower than they were 15 years ago. However, everyday products are becoming a more and more important source of such pollutants. Emissions from factory chimneys have been cut drastically, but pollutants are incorporated into manufactured products and can be released during their use and when they are disposed of. In many places, soil and sediments are still polluted by substances released many years ago. Substantial amounts of persistent, bioaccumulative and toxic substances also reach Norway in the atmosphere and with ocean currents.

Waste is a source of various types of pollutants, including persistent, bioaccumulative and toxic substances and greenhouse gases. Waste quantities are still rising in Norway, in recent years rather faster than the rate of economic growth. But the proportion of non-hazardous waste recovered has remained stable at about 78 %. The quantity of hazardous waste is also rising, but more and more of it is being dealt with through approved channels.

Like heavy metals and organic pollutants, radioactive substances can cause environmental damage. Monitoring shows that levels of radioactive pollution in Norway are declining as a result of lower releases from the Sellafield reprocessing plant in England.

Releases of pollutants from the oil and

## Global cooperation needed to deal with mercury

Mercury is a highly toxic and dangerous pollutant. It is transported to areas far from pollution sources with ocean currents and in the atmosphere, and is a threat to the environment and to human health. It can cause foetal damage and damage to the nervous system, and we know that children are particularly susceptible to exposure to mercury.

Total Norwegian releases of mercury to air, soil and water were reduced from about 6 tonnes in 1985 to 2.5 tonnes in 1995 and to about 1 tonne in 2008. Emissions to air in Norway are now considerably lower than the atmospheric transport of mercury to Norway from other countries.

International efforts are essential to reduce the global spread of mercury. Norway was one of the countries that took the initiative for a new global instrument to reduce the use and releases of mercury.

gas industry are considerably higher in Norway than in the other North Sea countries. However, Norway's share of total emissions to the North Sea region dropped from 59 % in 2007 to 51 % in 2009.

### Building up knowledge and reducing releases

Tens of thousands of chemicals are in use on the European market, in huge numbers of different products. In the majority of cases, we know little or nothing about their effects on health and the environment. Nanomaterials are already in widespread use, but information on possible risks to health and the environment is inadequate. It is therefore essential to build up sound knowledge and adequate control of new substances that are being introduced to the market. Everyday products like clothes, furniture, hobby articles, computers and mobile phones may contain chemicals we know little or nothing about. Research and monitoring of new chemicals and their use is therefore essential.

In many places, the soil and marine

## National targets

### – A non-toxic environment

- 9.1. Releases and use of substances that pose a serious threat to health or the environment will be continuously reduced with a view to eliminating them by 2020.
- 9.2. The risk that releases and use of chemicals will cause injury to health or environmental damage will be minimised.
- 9.3. The dispersal of substances that are persistent, bioaccumulative and toxic, and of other substances that give rise to an equivalent level of concern, from contaminated soil will be stopped or substantially reduced. Steps to reduce the dispersal of other substances that may cause injury to health or environmental damage will be taken on the basis of case-by-case risk assessments.
- 9.4. Contamination of seabed sediments with substances that are hazardous to health or the environment will not give rise to serious pollution problems.
- 9.5. Releases, the risk of releases and the spread of radioactive substances that may cause damage to health or the environment will be minimised. All radioactive waste will be handled safely and in an approved manner.
- 9.6. The growth in the quantity of waste generated will be considerably lower than the rate of economic growth.

sediments are still contaminated as a result of earlier industrial activities. These pollutants may be released and spread to other areas. Some pollutants are also transferred along the aquatic food chain and may end up in fish and shellfish eaten by people.

The continuing rise in waste generation will gradually add to the problems relating to waste management. This is why Norway is seeking to decouple the growth in waste quantities from economic growth.

Waste disposal can result in releases of environmentally harmful substances to soil, air and water. Strict regulation has been introduced to limit releases of pollutants from landfills and incineration plants. A better solution for many types of waste is re-use or recovery. Encouraging re-use and recycling reduces the amount of waste landfilled or incinerated, and makes better use of the resources in waste.

Although Norway has no nuclear power plants, radioactive substances are used for many different purposes, for example in hospitals and in research and education. Their use can result in releases of radioactivity, and generates radioactive waste that must be stored appropriately. Radioactive pollution and waste can also be generated by various types of process industries and during mineral extraction and excavation in areas where shale contains high levels of radon. There are also radioactive components in some consumer products, such as smoke detectors.

### Chemicals that are hazardous to health and the environment

Norway is seeking to minimise the risk that releases and use of chemicals will cause injury to health or environmental damage. The use and releases of



substances that are persistent, bioaccumulative and toxic is to be eliminated by 2020. The precautionary principle will be applied when information on the risks to health and the environment is uncertain.

Persistent, bioaccumulative and toxic substances travel long distances in the atmosphere and with ocean currents and through trade in products, and international cooperation is therefore essential to deal with the problems they can cause. Norway is actively involved in work under various international conventions, including the Stockholm Convention on Persistent Organic Pollutants (POPs), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, and the protocols on POPs and heavy metals under the Convention on Long-Range Transboundary Air Pollution. Norway has also been playing a key role in work to develop a new global legally binding instrument on mercury.

Norway's pollution control legislation is an important instrument for regulating releases of pollutants at national level. Under the Pollution Control Act, pollution is forbidden without specific permission. Municipalities can also set limit values for pollution and other requirements regarding environmental quality in zoning plans under the Planning and Building Act.

The product control legislation is also important for regulating the use of chemicals in Norway. Norwegian and EU chemicals legislation is largely harmonised through the Agreement on the European Economic Area, but there is some room for national regulation of a number of specific substances. Taxes are





also used as a way of limiting the use of some substances.

Knowledge building is very important to identify the risks different substances pose to health and the environment, and in order to develop effective regulation and other measures. The Government is taking steps to build up knowledge about chemicals and the presence of persistent,

bioaccumulative and toxic substances in products and the environment.

### Waste

The overall objective of Norway's waste policy is to make better use of the resources in waste, and at the same time minimise releases of greenhouse gases and persistent, bioaccumulative and toxic substances from waste. This involves the coordinated use of various policy instruments, including the pollution control legislation, taxes, refund, take-back and deposit and return schemes, agreements with industry and information activities. The idea is to ensure a sound balance in economic and environmental terms between waste recovery and incineration and landfilling.

The Government has decided to present a white paper on waste policy, focusing on ways of improving the use of the resources in waste and waste prevention.

### Radioactive substances

Releases, the risk of releases and the spread of radioactive substances that may cause damage to health or the environment will be minimised. All radioactive waste will be handled safely and in an approved manner. The scope of the Pollution Control Act has been expanded to include radioactive pollution and radioactive waste. A declaration system for radioactive waste has been introduced, and will provide better information on the quantities and types of waste.

- 9.7. The proportion of waste recovered will be raised to about 75 % of the total quantity in 2010 and subsequently to 80 %. This is based on the principle that the quantity of waste recovered should be increased to a level that is appropriate in economic and environmental terms.
- 9.8. Hazardous waste will be dealt with in an appropriate way, so that it is either recovered or sufficient treatment capacity is provided within Norway.
- 9.9. The generation of each type of hazardous waste will be reduced by 2020 compared with the 2005 level.

## Fly-tipping

Illegal dumping of cars, agricultural machinery, electrical and electronic equipment and other waste is a threat to people and wildlife and can cause serious pollution. Fly-tipped waste is also extremely unsightly. There may be as many as several thousand fly-tipping sites in Norway. An important principle of environmental policy is that the polluter should pay – which in this case means that whoever produces the waste is responsible for the costs of transport, storage and proper treatment. People and companies can sometimes cut their costs considerably by dumping waste illegally, and may therefore resort to fly-tipping.

The municipalities are responsible for monitoring littering and fly-tipping. They can issue orders to clean up fly-tipped waste, and can impose fines if those responsible do not comply. The county governors are responsible for supervising and advising the municipalities.



# Clean air

Invisible, but nevertheless a basic necessity. Plants, animals and people require air every minute, from birth to death.

A clean atmosphere is essential for our health and well-being and for a healthy fauna and flora, and in Norway we are fortunate enough to enjoy clean, clear air in most of the country. However, local air quality is not satisfactory in all Norwegian towns. The national targets for local air quality are not always met, for example in areas where there is heavy road traffic or when large numbers of people are using fuelwood or oil for heating during cold spells in winter. Poor air quality can damage health, and some population groups are more vulnerable than others.

Air pollutants that are responsible for acid rain, eutrophication and the formation of ground-level ozone are

also transported to Norway from other parts of Europe. Acid rain has wiped out many fish stocks in Norway. Although the situation has improved, acidification of lakes and rivers will continue to be a problem in large parts of the country unless emissions are further reduced in other European countries as well. New emissions cuts have now been agreed under the Gothenburg Protocol for the period up to 2020. At national level, the Norwegian Government is making a particular effort to reduce emissions of nitrogen oxides (NO<sub>x</sub>) in accordance with international commitments.

Noise is one of the environmental problems that affects the largest number

of people in Norway. The main source is road traffic, which according to the World Health Organization is responsible for the loss of many “healthy life years”.

## Cleaner air today than in the 1990s

### Local air quality

Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>) are the dominant components of local air pollution. Air quality has generally improved since the 1990s, but in 2010, there were still places where the targets for particulate matter and NO<sub>2</sub> were not met (too many exceedances of the target levels). For particulate matter, modeling indicates that as a rough estimate,

this affected 60 000 people in Oslo and 5 000 in Trondheim. There are also some smaller towns and built-up areas where the target for particulate matter is not being met.

For NO<sub>2</sub>, modelling indicates that 4 000 people in Oslo were affected by failure to meet the NO<sub>2</sub> target. However, the results are uncertain, and this figure may be an underestimate. During cold spells in winter there is often little or no wind, and high pollution levels can build up near the busiest roads. Temperature inversions frequently develop in these weather conditions, trapping cold air and pollutants near the ground. Inversions often last only for a few hours, but they may persist for several days, exposing a large proportion of the population to high pollution levels. This happened in Bergen in January 2010 and in Oslo in January 2003 and 2009.

Other pollutants, including sulphur dioxide (SO<sub>2</sub>), ground-level ozone (O<sub>3</sub>), carbon monoxide (CO), polycyclic aromatic hydrocarbons (PAHs) and benzene, can also reduce local air quality.

#### Long-range transboundary air pollution

Emissions of sulphur and nitrogen in Europe have been reduced by 60 and 20 % respectively since 1990, resulting in similar reductions in inputs to Norway.

In 2005, the area affected by acid deposition exceeding critical loads for acidifi-

cation of surface water corresponded to about 10 % of Norway, and this has not changed significantly in recent years. However, critical loads for acidification of forest are not exceeded in Norway.

Acidification has seriously harmed much of the freshwater fauna across much of the southern half of Norway. There is still serious damage to benthic animals and crustaceans, and the situation has not stabilised. About 15 000 fish stocks have been wiped out or severely depleted. In recent years there has been an improvement in water quality. There are also signs that fish stocks are recovering, although many lakes are still without fish.

The area where nitrogen deposition exceeds critical loads for eutrophication of terrestrial ecosystems declined from 1980 to 1995, but has not changed since then. Critical loads were still exceeded in about 14 % of the area of Norway in 2005. Nitrogen deposition has resulted in changes in biodiversity both in Norway and in other parts of Europe. Norwegian monitoring programmes show a clear relationship between atmospheric deposition of nitrogen and species composition, and that there are negative impacts on ground vegetation and algal growth. In nutrient-poor freshwater bodies, higher nitrogen inputs result in increased algal and other plant growth and changes in biodiversity.

High-ozone episodes in Norway often



## Definitions

**Particulate matter** is a complex mixture of microscopic particles in air. Particles are formed during combustion and by mechanical wear. They include both wind-blown dust of various kinds and particles formed directly in the atmosphere by condensation of vapours. Particulate matter is divided into different categories according to size. The most important of these are PM<sub>10</sub> (particles less than 10 micrometres (µm) across) and PM<sub>2.5</sub> (particles less than 2.5 µm across).

**Acid rain:** Acidification is caused by inputs of sulphur and nitrogen compounds. These may be deposited in rain and snow (wet deposition) or directly from the atmosphere (dry deposition). Nitrogen oxides (NO<sub>x</sub>) are largely formed at high temperatures during the combustion of fossil fuels.

**Ground-level ozone:** Ozone (O<sub>3</sub>) is a gas found both in the protective ozone layer and near ground level, where it is an air pollutant. It is formed by reactions between nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs) in the presence of sunlight. The main source of ground-level ozone in Norway is long-range transport of pollutants from other countries in Europe. However, emissions in Norway also contribute to the formation of ground-level ozone, especially near major pollution sources. High levels of ground-level ozone can cause health problems and damage vegetation and materials. Critical levels for human health and vegetation are sometimes exceeded in summer in Norway.

**Noise** means any unwanted sound such as excessive traffic or industrial noise, but also sounds that are normally experienced as positive.

## National targets

### – Clean air

- 10.1. Air pollution (SO<sub>2</sub>, NO<sub>x</sub>, VOCs, ammonia and particulate matter) will not cause health or environmental damage.
- 10.2. Annual emissions of sulphur dioxide (SO<sub>2</sub>) will be maintained at less than 22 000 tonnes.
- 10.3. Annual emissions of nitrogen oxides (NO<sub>x</sub>) will not exceed 156 000 tonnes.
- 10.4. Annual emissions of volatile organic compounds (VOCs) will be maintained at less than 195 000 tonnes. Annual emissions from the entire mainland and the Economic Zone of Norway south of 62° N will be maintained at less than 70 % of the 1989 level (188 000 tonnes).
- 10.5. Annual emissions of ammonia will be maintained at less than 23 000 tonnes.
- 10.6. The 24-hour mean concentration of particulate matter (PM<sub>10</sub>) will not exceed 50 µg/m<sup>3</sup> on more than 7 days a year.
- 10.7. The hourly mean concentration of nitrogen dioxide (NO<sub>2</sub>) will not exceed 150 µg/m<sup>3</sup> for more than 8 hours per year.
- 10.8. Consumption of hydrochlorofluorocarbons (HCFCs) will be phased out by 2010.
- 10.9. There will be no consumption of halons, any type of chlorofluorocarbons (CFCs), tetrachloromethane, methyl chloroform or hydrobromofluorocarbons (HBFCs).

occur in conjunction with high-pressure systems over continental Europe, which tend to transport polluted air northwards. The highest ozone levels are generally measured between Vest-Agder county and the Oslofjord. High-ozone episodes generally last for a few hours or days, and usually occur in spring and early summer. The target values for ground-level ozone in Norwegian and EU legislation are exceeded every year, but the degree to which they are exceeded and the number of episodes vary a great deal from year to year. The information threshold for ozone is rarely exceeded in Norway (the most recent episode was in 2006).

Critical levels of ozone for crops are exceeded in some years in Norway, while critical levels for forest are rarely exceeded.

#### Noise

About 1.7 million people in Norway are exposed to average noise levels exceeding 50 decibels outside their homes. This includes noise from aircraft, railways, industry and other commercial activities. For road traffic noise, only exposure to noise levels exceeding 55 decibels is included. Almost half a million Norwegians experience annoying or highly annoying noise levels outside their homes, and about 200 000 of them suffer from sleep disturbance.

People are often affected by a combination of noise and other factors such as air pollution. Noise can cause mental stress and physical problems.

#### International agreements work

##### Local air pollution

The most important sources of particulate



matter are road traffic (including exhaust emissions and asphalt dust from the use of studded tyres), fuelwood use and long-range transport of pollutants. Road traffic, particularly diesel vehicles, is the most important source of NO<sub>2</sub> emissions. The health risks associated with air pollution depend both on the concentrations of different pollutants and on how long exposure to them lasts. The Climate and Pollution Agency and other government agencies are considering whether Norway should implement stricter limit values for air pollutants in the Pollution Regulations.

#### Long-range transboundary air pollution

Many countries have undertaken to reduce their emissions of air pollutants under the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone. In May 2012, they adopted amendments to the protocol and agreed on new emissions cuts to be achieved by 2020.

Norway regulates emissions to air through individual discharge permits for industrial facilities and through regulations under the Pollution Control Act or other relevant legislation. In addition, a tax and the 2008 and 2010 agreements between the Government and a range of trade organisations are important instruments for reducing NO<sub>x</sub> emissions.

Norway is also playing an active part in efforts within the International Maritime Organization (IMO) to develop effective rules to reduce emissions to air from shipping. In 2008, IMO adopted new, stricter limits for NO<sub>x</sub> emissions, and it has also laid down specific limits for the



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sulphur content of fuel oil used in the North Sea area.

### Ozone-depleting substances

Emissions of ozone-depleting substances have been depleting the Earth's stratospheric ozone layer over the past 30 years. Consumption of ozone-depleting substances has now been drastically reduced worldwide, but the ozone layer is unlikely to recover completely before 2050–70.

Norway too has achieved steep reductions in the use of ozone-depleting substances, and has phased out a number of substances. We have met our commitments under the Montreal Protocol. We are also involved in its further development, for example in phasing out hydrochlorofluorocarbons (HCFCs), which are still used in large cooling and freezing systems and in the production of insulating foam. It is important to ensure that banks of ozone-depleting substances that are no longer in use are dealt with properly and destroyed.

### Noise

Under Norway's Pollution Regulations, steps must be taken to reduce noise if people are exposed to an average indoor noise level exceeding 42 decibels. Noise from sources including industry, motor sport and shooting ranges can be regulated under the Pollution Control Act, and the Product Control Act can be used to set noise limits for various types of products. Ensuring appropriate land use under the Planning and Building Act is another important way of avoiding noise problems.

Noise abatement measures include facade insulation and noise screens, using low-noise technology for road surfaces, tyres and vehicles, and lowering speed limits. More action will have to be needed to achieve the national targets for noise reduction.

- 10.10. By 2020, noise annoyance will be reduced by 10 % from the 1999 level.
- 10.11. By 2020, the number of people exposed to indoor noise levels exceeding 38 dB will be reduced by 30 % compared with the 2005 level.
- 10.12. Municipal, county and regional planning will help to ensure that air pollution does not cause health or environmental damage and that noise annoyance is reduced.



# A stable climate

Only two degrees warmer? It doesn't sound very dramatic, but if you think how ill and feverish you feel if your own temperature is two degrees above normal, you realise that it's no trivial matter. Climate change is probably the greatest threat humanity has ever faced.

We cannot actually say that the Earth is sick, but combustion of fossil fuels and deforestation are certainly causing its temperature to rise. Higher temperatures will bring rising sea levels and more extreme weather, including heavy rainfall, flooding and drought. This will have serious implications for our way of life.

Climate change is already putting lives and societies at risk, particularly in developing countries, and may result in irreversible changes to ecosystems and the loss of species and habitats. Species that are already threatened, such as the

Arctic fox (*Vulpes lagopus*), wild reindeer (*Rangifer tarandus*) and snowy owl (*Bubo scandiacus*), may be lost for ever.

We need swift and deep cuts in emissions of greenhouse gases, both globally and nationally. We must design national targets and instruments on the basis of international goals, commitments and cooperation arrangements. At the 2009 climate summit in Copenhagen, world leaders adopted the target of keeping the increase in global temperature below two degrees Celsius relative to the pre-industrial level. In practice,

however, we are nowhere near to achieving this. We must put in place stronger policies and take more effective action.

Even a temperature rise of up to two degrees will have major impacts on the natural environment and human society. We must take action to alleviate the most serious impacts of climate change on future generations and other parts of the world. This means that as well as cutting emissions, we must adapt to the climate change we are already witnessing and to the changes that will be inevitable in the future.



Cruise ship off Svalbard.  
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### Can the world meet its climate target?

Researchers across the world are more confident than ever before that most of the warming observed over the last 50 years is attributable to human activities. Measurements of greenhouse gas concentrations in the atmosphere and in ice cores show that the carbon dioxide (CO<sub>2</sub>) concentration in the atmosphere is higher than it has been for the past 650 000 years. Record temperatures are being observed all over the world, and new findings tell us that these observations are no coincidence, but signs of a changing climate. Rising temperatures also mean rising sea levels, melting glaciers and a reduction in the extent of the sea ice.

Science also tells us it is not too late to limit global warming to levels that will avoid the most severe consequences. However, in its publication World Energy Outlook 2010, the International Energy Agency emphasised that the two-degree target can only be achieved through rigorous implementation of current commitments up to 2020 and much stronger action thereafter. Cutting emissions sufficiently would require a far-reaching transformation of the global energy system and a phenomenal policy push by governments worldwide. Renewable energy and nuclear would have to double their share of the energy mix, and oil demand would have to peak just before 2020 and decline after that.

The United Nations Environment Programme, UNEP, has since published the report Bridging the Emissions Gap, which also concludes that it is possible to achieve the two-degree target using existing technologies, but that this will require full implementation of current commitments for 2020 and additional action.

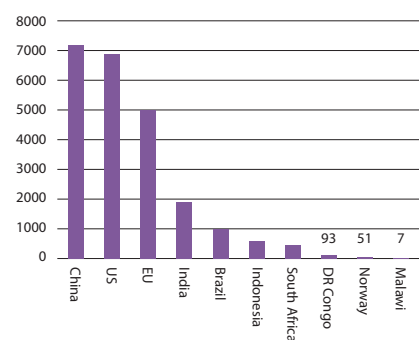
### Climate change concerns us all

Images of roads and railway tracks washed away by flash floods remind us that even in the richest countries of the world, we are vulnerable to extreme weather. Floods, drought,

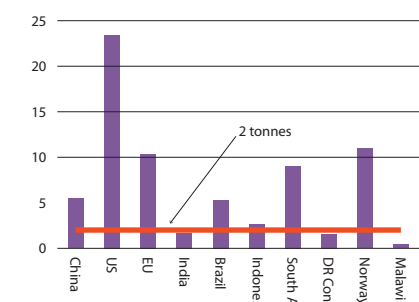
**Figure 11.1:**  
**Greenhouse gas emissions in selected countries in 2005**

The projections described in the IPCC's Fourth Assessment Report show that global greenhouse gas emissions may rise by 25–90 % from 2000 to 2030 if no new steps are taken to cut emissions. This scenario assumes that fossil fuels will still account for a substantial proportion of world energy use in 2030. The IPCC has also estimated how much emissions need to be cut by 2050 if we are to limit global warming to less than 2 degrees Celsius. Given an estimated world population of nine billion, global emissions need to be limited to roughly 2 tonnes CO<sub>2</sub> equivalents per person (indicated by the red line in the lower figure).

**Greenhouse gas emissions per country**  
(in million tonnes CO<sub>2</sub> equivalents)



**Greenhouse gas emissions per person**  
(in million tonnes CO<sub>2</sub> equivalents)



heat waves and a rising sea level put us all at risk, but will affect the poorest and most vulnerable parts of the world most severely. Many people who live in drought-ridden areas, in the major river deltas or in low-lying coastal areas and islands may be forced to abandon their homes.

## National targets

### – A stable climate

- 11.1. Norway will voluntarily strengthen its Kyoto commitment by 10 percentage points, which corresponds to cutting emissions to 9 % below the 1990 level.
- 11.2. Norway will undertake to reduce global greenhouse gas emissions by the equivalent of 30 % of its own 1990 emissions by 2020. The 2007 white paper on climate policy and the 2008 agreement between the political parties concluded that a realistic target is to reduce Norwegian emissions by 15–17 million tonnes CO<sub>2</sub> equivalents relative to the reference scenario presented in the National Budget for 2007, when CO<sub>2</sub> uptake by forest is included in line with existing rules under the Kyoto Protocol.
- 11.3. If an ambitious global climate agreement is achieved under which other developed countries also take on extensive obligations, Norway will undertake to achieve carbon neutrality by 2030 at the latest. This means that Norway would have to reduce emissions by the equivalent of 100 % of its own emissions by 2030.
- 11.4. Efforts to reduce deforestation and forest degradation in developing countries will reduce greenhouse gas emissions and promote sustainable development and poverty reduction.
- 11.5. Norwegian society will become less vulnerable to climate change, and Norway's adaptive capacity will be strengthened.
- 11.6. By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks will be enhanced through conservation and restoration, including restoration of at least 15 % of degraded ecosystems, thus contributing to climate change mitigation and reducing vulnerability to climate change.
- 11.7. Municipal, county and regional planning will provide a suitable framework for a coordinated land-use and transport policy that contributes to low greenhouse gas emissions and reduces the vulnerability of society to climate change.

The impacts of climate change vary widely across the world. In the Arctic, the temperature is rising twice as fast as in the rest of the world, and dramatic changes in the extent of sea ice cover have been observed in recent years. These changes are intensifying global warming. Melting ice and snow expose open water and bare ground, which reflect less of the sunlight, instead absorbing it and causing further warming. Work under the Arctic Council also shows that deposition of soot particles on snow and ice, where they absorb sunlight, is making a significant contribution to ice melt in the Arctic and thus to global warming. Measurements show that the temperature of the permafrost has risen by up to two degrees. If the permafrost melts, large quantities of methane – a potent greenhouse gas – may be released from the soil, thus speeding up climate change even further. Monitoring of greenhouse gases in Svalbard has shown a marked rise in the atmospheric concentration of methane in the last five years.

The annual mean temperature for mainland Norway has risen by almost 1 °C in the past 100 years, while annual precipitation has risen by almost 20 %. The annual mean temperature is expected to rise by a further 2.3 to 4.6 °C by the end of this century, and annual precipitation by a further 5–30 %. A range of other changes are also expected, all of which will have impacts on the environment and Norwegian society – rising sea level, a longer growing season, more risk of flooding and landslides, warmer seas, ocean acidification and a decrease in the duration of snow cover.

Climate change is expected to result



in changes in all habitat types in Norway. It will intensify the effects of other human pressures and may result in the loss of biodiversity. Arctic and mountain species and ecosystems will be particularly vulnerable. Climate change is altering the framework for social planning in various ways. Areas where it was once safe to build may become more vulnerable to flooding and landslides. Changes in patterns of rainfall may result in greater inputs of pollutants, particulate matter and nutrients to many lakes and rivers. On the other hand, higher rainfall may increase the profitability of the hydropower sector, and agriculture and forestry may benefit from the longer growing season.

### What is Norway doing?

Norway is working towards a legally binding global agreement that includes commitments by all major emitters, and is ambitious enough to limit the rise in the global mean temperature to 2 degrees Celsius above the pre-industrial level. In accordance with the IPCC's recommendations, our goal is for global emissions to peak by 2015 at the latest, and then be reduced by 50–85 % by 2050 compared with the 2000 level. A well-functioning global carbon market will be required to meet the investment needs that will arise in connection with the transition to a more climate-friendly society. The CO<sub>2</sub> tax and the emissions trading system are two of the most important instruments of Norway's national climate policy. They ensure that emissions have a price, and that it is more expensive to act in a way that has negative impacts on the climate than to be climate-friendly. About half of all Norway's emissions will be included in





## Norway is supporting the world's largest-scale climate project

Emissions from deforestation and forest degradation in developing countries make up 17.4 % or about one-sixth of the world's total greenhouse gas emissions. According to the IPCC, reducing emissions from deforestation and forest degradation (known as REDD) is a cost-effective way of cutting emissions and at the same time maintaining biodiversity. It can also promote sustainable development and poverty reduction.

Norway is playing a leading role in efforts to include REDD in a binding global climate agreement. Norway's International Climate and Forest Initiative is running cooperation projects with individual countries to demonstrate systems for paying developing countries to reduce these emissions. Through UN programmes, the World Bank and regional developing banks, Norway and other donors are supporting REDD activities in more than 40 developing countries.

The unique achievement of the Climate and Forest Initiative has been the establishment of performance-based payment systems in partnerships with Brazil, Indonesia and Guyana. Brazil and Indonesia alone account for more than half the world's total emissions from deforestation and forest degradation. Norway has pledged up to NOK 6 billion to each of the two countries for documented emissions reductions and political reforms. This is encouraging policy changes. The world's most important forests are in areas where corruption and poor governance are serious problems, and where powerful national and international commercial actors are involved in deforestation. High-level political ownership of projects is therefore extremely important. If these efforts are successful, they will bring major benefits. The emissions reductions Brazil achieved in 2010 are probably the largest-scale climate project any country has implemented.

the emissions trading system from 2013 onwards.

The Government has altered the system for calculating purchase tax on vehicles to make vehicles with the lowest emissions cheaper. It is also taking steps to limit the growth in road traffic and is promoting public transport, vehicles with low fuel consumption and alternative engine technologies. There is now a requirement that biofuels must account for at least 3.5 % by volume of annual sales of road traffic fuels. Conditions for pedestrians and cyclists must also be improved. Some other important developments are:

- the Technology Centre Mongstad is under construction: this is a facility for testing CO<sub>2</sub> capture and storage technologies;

- an agreement between the government and industries not included in the emissions trading system for the period 2008–12 has ensured a ceiling on their emissions for this period;
- climate research and research on renewable energy has been strengthened;
- central government planning guidelines have been adopted on municipal climate and energy planning and on coordinated land-use and transport planning.

In 2010, a government-commissioned report assessing Norway's vulnerability to climate change and the need for adaptation measures concluded that Norway is a resilient society with high

adaptive capacity. However, it also emphasised that adaptation measures need to be put in place quickly to maintain Norway's resilience. The report will be followed by a white paper on climate change adaptation.



# Knowledge and geographical information

Research and monitoring provide us with a sound knowledge of the environment, which is the foundation for our knowledge-based environmental management regime.

## National targets

Relevant geographical information of high quality will be available for the whole country and will be used effectively across sectors and administrative levels.

The process of registering rights to real property and shares in housing cooperatives will be sound and effective and maintain a high standard.

Environmental policy must be based on knowledge of ecological interactions and interactions between nature and society, and the pressures and impacts associated with human activities in various sectors. A sound knowledge of causal relationships makes it possible to evaluate the consequences of our actions.

Knowledge can be built up through research, mapping, monitoring, compilation of statistics and various types of reporting. Environmental monitoring addresses known issues and needs to be organised in the form of long-term, stable and predictable monitoring programmes. Research generates new knowledge and raises new questions, but also acts as a useful supplement and corrective to monitoring. Mapping provides us with information on the occurrence and distribution of species and habitat types. Long time series of observations are of crucial importance in both research and monitoring when circumstances change.

Reporting often requires information to be uploaded to databases for specific fields. Important databases in Norway include “Naturbase” (for habitat types, species, protected areas and areas set aside for outdoor recreation), the Species Map Service run by the Norwegian Biodiversity Information Centre, “Askeladden” (the cultural heritage), and the Norwegian Pollutant Release and Transfer Register. The KOSTRA system for reporting and publishing local government information is particularly important for the public administration.

The environmental authorities cooperate with Statistics Norway on the development and production of environmental statistics. These are largely based on data obtained from monitoring and reporting systems. A great deal of effort has been put into developing digital map solutions and systems for handling geographical information.

## Cooperating across disciplines and sectors

The cross-cutting nature of many environmental policy issues means that it is essential to consider the whole picture and find a balance between different public interests to gain support for action.

## Nature Diversity Act, section 8 (knowledge base)

Official decisions that affect biological, geological and landscape diversity shall, as far as is reasonable, be based on scientific knowledge of the population status of species, the range and ecological status of habitat types, and the impacts of environmental pressures. The knowledge required shall be in reasonable proportion to the nature of the case and the risk of damage to biological, geological and landscape diversity.

Furthermore, the authorities shall attach importance to knowledge that is based on many generations of experience acquired through the use of and interaction with the natural environment, including traditional Sami use, and that can promote the conservation and sustainable use of biological, geological and landscape diversity.

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## Environmental technology

Norway's strategy for environmental technology was published in 2011. Its aim is to promote the development of an internationally competitive Norwegian environmental technology sector and national and international markets for environmental technology. The document sets out steps for developing supply and demand and for improving the knowledge base for further policy and technology development. The largest single measure is a programme designed to promote private investment in commercialisation of environmental technology and encourage networking and strategic cooperation between suppliers of systems and solutions.

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Cooperation across disciplines and sectors is therefore essential in building up our knowledge of environmental issues. Action taken to deal with a particular environmental problem may also have impacts – either negative or positive – in other areas. We therefore need research that can improve our understanding of the implications of environmental policy targets for other public interests.

The environmental authorities are promoting long-term development of expertise by providing financial support to the environmental research institutes and by funding some basic research within the research programmes run by the Research Council of Norway. It is essential that these institutes have the capacity and equipment to meet the needs of the environmental authorities.

### Communicating what we know

Communicating information to the general public and to decision-makers is just as important as building up the knowledge base. People, the business sector, the public authorities and voluntary organisations all need sound information if they are to take environmental considerations into account in their day-to-day activities. Information is provided through the traditional media, websites, publications and the social media. For example, the website Klimaløftet is being used to coordinate information from the public sector on climate change and what people can do to reduce their emissions. State of the Environment Norway collects together official information on environmental status and trends in Norway.

Another important task is to provide information that can awaken curiosity and interest about nature and the environment among children and young people. The “environmental rucksack” project is one of the larger initiatives targeting the school sector.

Displaying environmental and other data as maps makes the information available to many user groups. Norway also has international reporting obligations under various inter-

national agreements. These include the Agreement on the European Economic Area, under which most EU environmental legislation is incorporated into Norwegian law. It is important to ensure that the information provided to meet reporting obligations provides a correct picture of the state of the environment in Norway.

### The international perspective

The nature of many environmental problems means that one country alone cannot resolve them. The whole research sector thus needs to become more international, and Norwegian research groups and institutions must be encouraged to take part in international activities. Norway is participating fully in the current EU research programme, the Seventh Framework Programme. This is organised around a number of themes, of which “environment (including climate change)” is of most interest to the Norwegian environmental authorities.

### Interplay between research and monitoring

Research is necessary to ensure that we obtain the best possible monitoring data, and monitoring data are in their turn an important basis for a great deal of research. Researchers' expertise is needed to interpret the results of monitoring programmes, and the knowledge gained through monitoring is very valuable in environmental research. Monitoring data enable scientists to analyse environmental trends, since the methods for obtaining the data are the same over long periods of time. Research based on such data is therefore

very valuable for the environmental authorities.

### Geographical information

The Ministry of the Environment is responsible for Norway's mapping and geodata policy and the registration of rights to real property. The Norwegian Mapping Authority is responsible for maps, geodata and cadastral information. This includes producing and updating national map series and maintaining up-to-date registers.

The public sector, private businesses and individual people all need geographical information. In many sectors, geodata is needed for documentation, valuation, analyses and statistics. Furthermore, commercial use of such data makes an important contribution to value creation. Geodata are also important in environmental monitoring, in building up knowledge about the climate and environment, and as a basis for preparedness. Modern maps do more than show where things are: they are also analytical tools, and can be used in planning for sustainable development.

Maps and environmental geodata are accessible 24 hours a day, thus helping the public authorities and others to make sound, sustainable decisions. Reliable and up-to-date geodata also help to improve safety at sea and on land.

Norway's 2010 Geodata Act is intended to ensure better access to environmental geodata in Norway and across national borders. The Mapping Authority is in charge of the development of a national geographical infrastructure through the Norway Digital initiative. It also maintains a register of all real property in Norway, and a separate register of property rights.



# Legislation and planning procedures

The Nature Diversity Act. The precautionary principle. The Planning and Building Act. The polluter-pays principle. A few examples of the principles underlying Norway's environmental policy and the legislative tools used by the authorities in their work.

## National targets

Norway will have a sustainable land-use policy. Municipal, county and regional planning will ensure that administrative procedures are effective and that there is close coordination between administrative levels and sectors.

All municipal, county and regional planning will take place within the framework of national policy.

The Planning and Building Act and other relevant legislation will be used actively to ensure that environmentally sound solutions are given weight in local and regional development and that environmental and social impacts are properly documented.

The environmental authorities are responsible for formulating environmental policy goals and strategies, and for drawing up plans for sound management of our environmental assets. Environmental policy has implications for almost every sector of society, and activities such as production, consumption, construction, resource use, public procurement and transport all have environmental impacts. Legislation is one of the key instruments of environmental policy. Important environmental statutes in Norway include the Planning and Building Act, the Pollution Control Act, the Nature Diversity Act, the Cultural Heritage Act, the Geodata Act and the Svalbard Environmental Protection Act. Economic instruments are also becoming increasingly important in environmental policy.

## Environmental policy – instruments and principles

A number of important principles underlie Norway's environmental policy. One of these is the polluter-pays principle, which states that anyone who causes pollution is responsible for the costs of clean-up and rectifying any damage. The precautionary principle states that where there is a risk that an activity will cause serious or irreversible damage, adequate precautions must be taken to prevent damage, or the activity should not be carried out. A lack of knowledge must not be used as a reason for postponing cost-effective measures. The Nature Diversity Act introduced

the principle of assessing cumulative environmental effects, which means that all pressures on ecosystems and species must be considered before decisions are made under environmental or other legislation. In addition, Norway follows the principle that the best available techniques (known as BAT) should always be applied to avoid environmental problems.

Another important principle of Norwegian environmental policy is that authorities, companies and other actors in every sector have an independent responsibility to integrate environmental considerations into their activities and to play a part in achieving the overall goals of environmental policy. The authorities in each sector are required to keep track of the health and environmental impacts of activities in their sector. They must also report on environmental trends in their sector and on the effects of policy instruments introduced to protect the environment. In some cases, large-scale plans are drawn up involving a number of sectors, for example the integrated management plans for the Barents Sea–Lofoten area and for the Norwegian Sea.

All policy instruments must also meet the criteria of effectiveness and cost effectiveness. This means that they must be designed so that targets are achieved without unnecessary use of time and resources and without unacceptable impacts on other sectors. Legislation and the taxation system should be perceived as reasonable and equitable and generally accepted.

## Important legislation

	Living seas and coastal environments	Healthy lakes and rivers	Rich and varied wetlands	Forest diversity	Spectacular mountain landscapes	A valuable cultural heritage	A good urban environment	The great outdoors	An unpolluted environment	Clean air	A stable climate
Planning and Building Act											
Geodata Act											
Pollution Control Act											
Svalbard Environmental Protection Act											
Cadastre Act											
Nature Diversity Act											
Outdoor Recreation Act											
Oslo Forest and Countryside Act											
Wildlife Act											
Norwegian Nature Inspectorate Act											
Off-road Motor Traffic Act											
Cultural Heritage Act											
Gene Technology Act											
Act relating to salmonids and freshwater fish											
State Commons Act											
Greenhouse Gas Emission Trading Act											
Environmental Information Act											
Product Control Act											

### Planning processes and the planning system in Norway

Through planning processes, we can develop urban and rural communities that are attractive to live in and that promote health and provide a good quality of life for all age groups. Planning is a tool for sustainable development and sound land use and resource management. Sustainable development means development that is in the best interests of individuals, society as a whole and future generations. The 2008 Planning and Building Act established tools for ensuring that Norwegian society develops in a way that meets people's needs, safeguards the environment and limits impacts on the climate. Good planning produces effective, environmentally sound transport solutions, maintains the security of society and ensures adequate areas for commercial activities, schools, day care centres and other important functions. Planning is also essential to ensure that biodiversity, the cultural heritage, valuable landscapes and important agricultural areas are safeguarded and used sustainably, in line with our national environmental targets.

The Planning and Building Act requires all planning and administrative decisions to be transparent and predictable. It also stresses that all interested parties and authorities must be able to take part in these processes. A long-term perspective is important, and environmental and social impacts must be described in the

relevant documents. The principles of universal design must be incorporated into planning processes and applied in individual building projects. In addition, aesthetic design and the provision of good surroundings for children and young people must be taken into consideration.

The Norwegian planning system has three levels: local (the municipalities), regional (the counties) and national. In the event of objections to municipal or regional plans, there are arrangements for mediation, and if necessary for the national authorities to make the final decision. Decisions and legal interpretations are made publicly available in electronic form, and the Ministry of the Environment publishes information and advice for the planning authorities.

Planning in a number of sectors needs to be tightened up. For example, too much development is still being permitted along the shoreline in various parts of the country. The remaining large continuous areas of natural environment are shrinking, and valuable areas of agricultural land are being developed for other purposes. Norway is seeking to reduce transport needs and greenhouse gas emissions, for example by avoiding the development of out-of-town shopping centres. The Ministry of the Environment is cooperating with other ministries and relevant bodies on important planning issues including urban development, coordinated land-use and transport planning, universal design, outdoor

recreation, renewable energy including wind power and small-scale hydropower, soil conservation and industrial development.

The planning system must deal with challenges in all parts of the country, from towns and built-up areas to the mountains and coastline. In the larger towns and the most densely populated parts of the country, the focus is on a growing shortage of space and the need for densification and to retain green spaces and develop environmentally sound, climate-friendly transport solutions. In other parts of the country, planning is an instrument for maintaining settlement patterns and creating new employment opportunities. Regional and local adaptations to planning processes are therefore essential.

Planning involves cooperation across sectors and between national, regional and local authorities. The overall framework is determined at regional and national level, but the municipalities have important responsibilities within this. In 2011, the first Government expectations for regional and municipal planning were published. Together with central government planning guidelines, they will in future constitute the framework for planning at all levels.

Sound knowledge about land use and resources is an essential basis for good planning. It is therefore necessary to develop a coordinated system for mapping and monitoring land use, and to improve access to maps and environmental geodata.



# International cooperation

Nature does not respect national borders. The major environmental problems transcend political boundaries, and require international action.

## National targets

Norway will play a leading role in efforts to develop new and stricter environmental agreements, particularly at global level.

Policies and the development of legislation in the EU and European Economic Area should result in high environmental standards and thus promote sustainable development.

Norway will work to ensure that global and regional cooperation bodies in the environmental field, including the UN Environment Programme (UNEP), are developed into effective tools for developing and implementing environmental policy.

The international trade and investment regime should provide for the use of environmental policy instruments and promote environmental and sustainable development concerns.

Norway will engage in strategic political dialogue with partner countries and assist these countries to enhance their capacity and willingness to undertake and implement international commitments.

Norway's development policy will contribute to greener development and to the development of capacity and expertise in environmental and natural resource management.

Limit environmental impacts of human activity and the risk of such impacts in the High North and the polar regions.

At present, conditions on our planet are suitable both for people and for a rich variety of other living creatures. But the environment is being altered by climate change, loss of biodiversity and the spread of pollutants, making the future uncertain for many species, including our own. And of course everything on Earth is connected to everything else. Climate change affects both the natural and the cultural environment. Grain varieties that are staple crops at present may become unsuitable in parts of the world as the climate changes. Unstable food supplies and extreme weather may lead to mass migrations and a rise in the global level of conflict.

Environmental problems affect countries all over the world, and international action is needed to deal with them. Individual countries cannot tackle such problems on their own. For example, the polar regions are being seriously affected by climate change and persistent, bioaccumulative and toxic substances transported from distant parts of the world. Environmental policy is increasingly being developed within the framework of international agreements. In today's globalised economy, the drivers of social development and environmental change are also becoming more and more international.

## Main challenges ahead

Through international cooperation, it has been possible to reverse some negative trends – for example as regards acid rain and depletion of the ozone layer. This shows that international agreements can be a very effective way of addressing serious environmental problems. However, we have not yet had the same success

in dealing with climate change and loss of biodiversity. In recent years, there has been growing awareness of the importance of ecosystems such as forests and wetlands for human welfare and survival. Despite this, large-scale destruction of these ecosystems is continuing in all parts of the world.

Conservation of ecosystems and biodiversity and effective measures to tackle climate change are key elements of a green economy. A related concept, sustainable development, was placed firmly on the agenda at the 1992 Earth Summit in Rio. In the 20 years since then, the world has changed dramatically. The economy and the business sector have become globalised. Countries are bound by common rules, including EU rules at regional level and rules developed by the World Trade Organization at global level. Most EU environmental legislation is incorporated into Norwegian law through the Agreement on the European Economic Area (EEA).

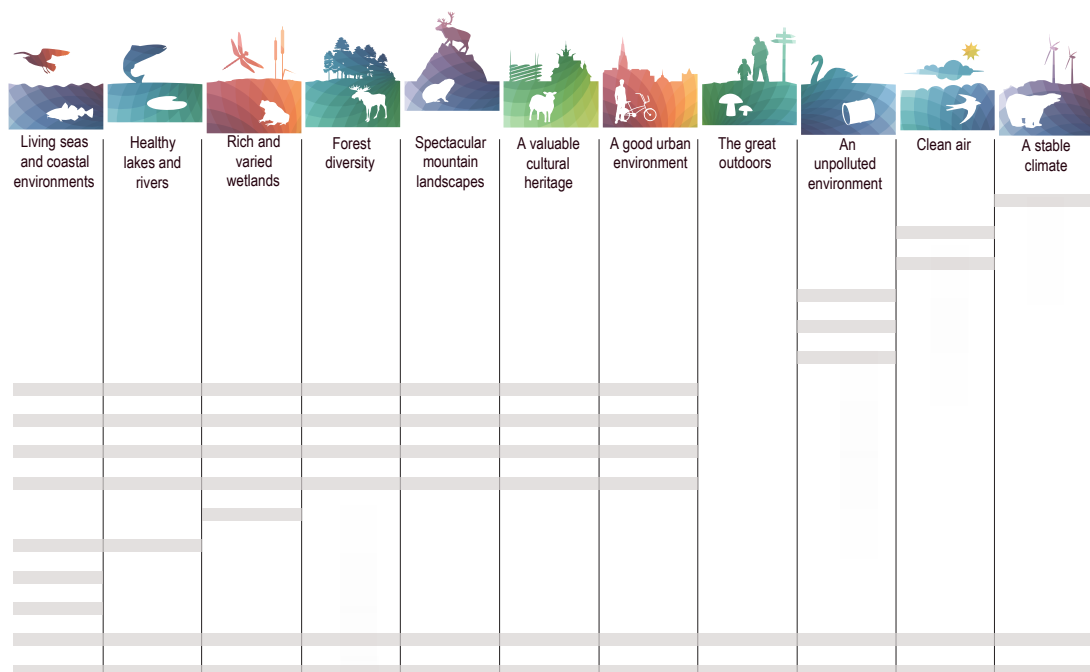
International cooperation to promote an ambitious environmental policy needs to take place both within organisations that focus mainly on the environment and within those that determine the framework for development in other sectors. Countries such as China, India, Russia and Brazil have far more influence than only a few years ago, and this must also be taken into account. Since 1992, the global balance of power has changed radically, both as regards environmental policy and in other policy areas.

## Environmental cooperation under the UN umbrella

Global environmental governance needs to be strengthened. A report from the

## Important conventions

Climate Change Convention  
 Vienna Convention  
 LRTAP Convention  
 Stockholm Convention  
 Rotterdam Convention  
 Basel Convention  
 Convention on Biological Diversity  
 Bonn Convention  
 Bern Convention  
 CITES Convention  
 RAMSAR Convention  
 NASCO Convention  
 OSPAR Convention  
 Polar Bear Agreement  
 Aarhus Convention  
 Espoo Convention



UN Secretary-General published in 2010 pointed out that progress has been slowest as regards the environmental pillar of sustainable development. At the Rio+20 summit in 2012, steps were taken to strengthen the position of the United Nations Environment Programme, UNEP, as the UN's most important environment policy body. The "Beyond GDP" initiative, corporate sustainability reporting and the Sustainable Energy for All initiative will be followed up as part of green economy policies. One important outcome was the establishment of a process to develop sustainable development goals to supplement the Millennium Development Goals.

### Environmental agreements and financing for global environmental targets

Norway aims to play a leading role in the development of global and regional agreements and to lead the way in implementing these agreements at national level. The Global Environment Facility, GEF, is an important mechanism for providing funding for projects to improve the global environment.

### Trade, investment and environment

A challenging task in the time ahead will be to ensure that the major trade and investment flows support the development of a green economy and do not undermine environmental policy. Environmental and trade rules must continue to be on

an equal footing and mutually supportive. Specific environmental provisions in free trade agreements can be an important way of ensuring this.

### The EU, the EEA and environmental policy

Most EU environmental legislation is incorporated into Norwegian law under the EEA Agreement. These rules are also important in trade with third countries, for example in chemicals and timber. In recent years, stronger interaction has developed between the EU and the multilateral environmental agreements. In some situations, the EU wishes to introduce more ambitious rules than those agreed through international consensus. The inclusion of aviation in the EU emissions trading system in 2012 is one example.

### Nordic cooperation and the OECD

The Nordic countries cooperate in various areas, including chemicals, green economy and valuation of ecosystem services. The green economy, valuation of ecosystem services and climate change are also important fields of analysis for the Organization for Economic Cooperation and Development (OECD).

### Development cooperation and bilateral environmental cooperation

The Ministry of the Environment has environmental cooperation arrangements

with China, India, Brazil and South Africa, all of which are key actors in terms of their impact on the environment and in policy development internationally. The cooperation includes various environmental topics and also provides a forum for environmental policy dialogue. In the field of development cooperation, the Ministry of the Environment and the Ministry of Foreign Affairs work together on climate change adaptation, for example relating to food security, and on the Clean Energy for Development and Oil for Development initiatives.

### The High North and the polar regions

The climate is changing rapidly in these regions, and the impacts are already obvious. This is resulting in growing pressure as a result of easier access and increasing interest in exploiting the natural resources of these areas. Cooperation with Russia is a key element of the Government's High North policy. Important topics include the marine environment, climate change, cross-border cooperation and pollution from industrial plants near the border. Other important forums for cooperation are the Arctic Council and the Barents cooperation. Norway has a special responsibility for protecting Svalbard's natural wilderness. The archipelago is becoming increasingly important as a reference area for climate and environmental research.

