

# Fourth Country Report to CBD, Denmark, Januar 2010

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## Executive summary

The status of biodiversity in Denmark reflects the country's high population density and a long history of intensive commercial exploitation of raw materials, soils, timber, water and stocks of wild species. The vast majority of the country is covered by highly modified urban, silvicultural and arable areas, where construction, cultivation and plantations limit biological diversity. However, there are some natural areas left with high biological diversity, and in the last 20 years nature restoration projects has been developed and implemented. The long protected coastal line, the extensive sea territory and more recent regulations to protect birds and mammals from unsustainable hunting has helped to protect large areas of important habitats and their biological diversity, including large populations of birds.

From a biodiversity perspective, forests hold the largest number of Danish species and also the largest number of threatened species. Forests cover has been down to a few percent of the land area two hundred years ago. Today 12% of the Danish terrestrial land area is forest, the vast majority of which is intensively managed logged plantations with relatively few old growth habitats and forest glades for endangered species<sup>1</sup>.

The main threats to Danish biodiversity are identified to be: Cultivation, pesticides, eutrophication, land drainage, overgrowing, high-intensity logging in forests and plantations, former activities to straighten and dam watercourses and commercial fishing<sup>2</sup>.

Urbanisation and infrastructure development can have negative consequences for biodiversity. Thus, such activities are regulated by Environmental Impact assessments and strategic Environmental Assessments.

The coastal and marine ecosystems must be considered the most important Danish contribution to European biodiversity, as Denmark holds a major proportion of the areas of dunes, saltmarsh and shallow marine waters, of crucial importance for specialised lichens, plants, fungi and invertebrates, as well as waterbirds, of which Denmark hosts a large globally important share of many flyway populations, e.g. East-Atlantic population of light-bellied brent goose (*Branta bernicla hrota*) (100%), Svalbard population of pink-footed goose (*Anser brachyrhynchus*) (100%) and the Baltic-Wadden Sea population of common eider (*Somateria mollissima*) (86%).

A large number of habitat specialists have experienced long-term declines and there are no indications that this decline has been halted or reversed yet.

In the last 20 years efforts have been made to secure biodiversity rich habitats in forest, through a Danish national strategy for natural forests, through certification and through a shift towards close to nature forestry practices of all the Danish state forests. However, many of these positive effects on threatened species will only manifest themselves fully after a long period of time, as forest ecosystems react slowly to changes.

In conclusion, the best current, scientific estimate is that biodiversity is still declining.

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<sup>1</sup> Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

<sup>2</sup> Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

It should be stressed that it is a challenging task to reverse population declines that follow decades of declining habitat area and quality. First, there is a marked delay in the population response to habitat destruction for most species, especially perennial and sedentary species which may survive long after de facto habitat destruction. When habitats are restored or conditions improved, the recovery delay may be even longer, especially for species with poor dispersal ability and highly fragmented populations.

Denmark has outlined its nature conservation policy objectives in a range of documents, which are in the process of being implemented:

The *National Strategy for Sustainable Development* (2009) sets targets and principles for sustainable development including the objectives of securing a high degree of biodiversity and preserving Denmark's ecosystems;

*The agreement on Green growth* (2009) is a political agreement in the Danish parliament. The purpose of the agreement is to ensure that a high level of environmental, nature and climate protection goes hand in hand with modern and competitive agriculture and food industries. This is an ambitious and long-term plan defining environment and nature policies and the agriculture industry's growth conditions. A total of DKK 13.5 billion is to be invested in Green Growth until 2015, which is about a 50% increase in investments compared to previous initiatives.

The *National Strategy on Natural Forests* (1992-2040) has as overall objective to conserve the biodiversity on the Danish Forests, including the gene resources present in these areas;

The *National Forest Programme* (2002) sets targets for increasing the national forest area and managing the forests in a way that takes the protection of the biological diversity better into account;

The *Action plan for Biodiversity and Nature Conservation* (2004-2009) specifies actions to protect nature and biodiversity in accordance with the national Strategy and with EU legislation and the Convention on Biological Diversity;

The *National Action plan on Alien Invasive Species* (2009) gives a number of recommendations on actions to be taken. The action plan focuses on prevention, eradication, information and capacity building, research and administration.

Denmark is also in the process for implementing 246 legally binding action plans for designated Natura 2000 areas and River Basin Management Plans for the whole country. The target of the Natura 2000 action plans are to ensure that the species and nature types for which the areas have been designated will achieve a favourable conservation status. The target of the River Basin Management Plans is to achieve a good ecological status for the surface waters and a good status for the ground water before 2015.

Moreover, Denmark has passed several changes to the national legislation. The latest changes (2009) forbids the authorities to grant permits to plans and activities which can 1) damage breeding and resting places or disturb a range of animal species, 2) destroy individuals in all their life stages of a number of plant species, which figure in annex IV of the EU habitats directive, wherever these animal and plant species might occur.

Denmark has also passed a national park law (2007). So far two national parks have been established and 3 more will follow in the coming years, depending on local consent.

In the last 20 years Denmark has carried out several large nature restoration projects among others for rivers, meadows, salmonids, coastal heaths and dunes and moors. Denmark has also

conserved more areas under national protection orders. In the last 9-10 years app. 24.000 ha of new forests and nature areas has been developed.

Moreover, nature management is carried out in agricultural lands to some extent, through e.g. voluntary nature plans, planting of deciduous hedgerows, digging of new ponds and clearing of overgrowth and environmentally friendly agricultural practices (MVJ- areas) etc.

Furthermore, Denmark is currently implementing a range of species action plans and a plan for combating invasive alien species.

Biodiversity considerations are being integrated into sectoral and cross-sectoral policies on especially infrastructural development, aquaculture, agriculture, forestry, fisheries, spatial planning, international cooperation and international development assistance.

Denmark has a strategy for the conservation of the genetic diversity of animal and plant resources in agriculture. However, genetic diversity plays a relatively little role in Danish Nature management. Considerations for genetic diversity are taken, for example through ex situ protection of genetic diversity of forest trees. Efforts towards conserving the genetic diversity of the living organisms are furthermore taken through the municipalities planning of corridors and core areas and through the incorporation of for example fauna passages, corridors and stepping stones in road and railway construction.

In the coming years more national parks are planned depending on local consent. 75.000 ha of new nature areas are also planned. The negative effect of pesticides and eutrophication will be reduced, and more species action plans are envisaged to be carried out. More over, Denmark will be bound by a coming EU marine framework directive. Denmark has designated new and enlarging existing marine Natura 2000 areas.

# Chapter I: Overview of Biodiversity Status, Trends and Threats

## Introduction

The status of biodiversity in Denmark reflects the country's high population density and a long history of intensive commercial exploitation of raw materials, soils, timber, water and stocks of wild species. The vast majority of the country is covered by highly modified urban, silvicultural and arable areas, where construction, cultivation and plantations limit biological diversity.

The long protected coastal line, the extensive sea territory and more recent regulations to protect birds and mammals from unsustainable hunting has helped to protect large areas of important habitats and their biological diversity, including large populations of birds.

From a biodiversity perspective, forests hold the largest number of Danish species and also the largest number of threatened species. Forests cover 12% of the Danish terrestrial land area, the vast majority of which is intensively managed logged plantations with relatively few old growth habitats and forest glades for endangered species.

In the last 20 years efforts have been made to secure such habitats, through a Danish national strategy for natural forests, through certification and through a shift towards close to nature forestry practices of all the Danish state forests. Moreover, many of these positive effects on threatened species will only manifest themselves fully after a long period of time, as forest ecosystems react slowly to changes.

The coastal and marine ecosystems must be considered the most important Danish contribution to European biodiversity, as Denmark holds a major proportion of the areas of dunes, saltmarsh and shallow marine waters, of crucial importance for specialised lichens, plants, fungi and invertebrates, as well as waterbirds, of which Denmark hosts a large globally important share of many flyway populations, e.g. East-Atlantic population of light-bellied brent goose (*Branta bernicla hrota*) (100%), Svalbard population of pink-footed goose (*Anser brachyrhynchus*) (100%) and the Baltic-Wadden Sea population of common eider (*Somateria mollissima*), (86%).

Chapter 1 consists of text from different sources, and put together by the Danish Ministry of Environment.

# The agricultural landscape

## Key issues

The population of 22 species of Danish farmland birds fell by 36 per cent between 1990 and 2008. Arable land has become more homogenous and many hedges have disappeared. Fields are on average 7 per cent larger than they were 10 years ago<sup>3</sup>.

## Factors affecting status

The agricultural picture (the arable landscape) is one of cultivated fields, fallow fields, permanent pasture, hedges and agricultural buildings. Cultivated fields comprise around 62 per cent of Denmark's land area. The percentage seems to be slowly decreasing. Besides producing food crops, these fields are home to some species of plant and animal. Arable land is thus an important feature of the Danish countryside and is highly significant for biodiversity. The main threats to biodiversity in agricultural areas are cultivation, pesticides, pollution by nutrients, land drainage and the clearing of habitats such as hedges and ponds. One of the best-known methods of assessing the condition of the natural environment in arable areas is to use population numbers of birds which are common to the habitat, such as lapwing, partridge and skylark.

## Current status

Monitoring of species on arable land concentrates on birds and certain mammals, whilst information on plants and insects is limited. The population of 22 species of Danish farmland birds fell by 36 per cent between 1990 and 2008. This is a clear indication of diminishing biodiversity on arable fields. Numbers of partridge (*Perdix perdix*) fell by 54 per cent between 2000 and 2008 and the little owl (*Athene noctua*) population fell by 63 per cent between 1998 (approx. 150 pairs) and 2008 (approx. 55 pairs). Numbers of hares (*Lepus europaeus*) have fallen drastically since the 1960s. The official game bag record for hares fell by 31 per cent between 2000 and 2007. It is anticipated that numbers will continue to fall in the coming years, as survival rates for young are at an all-time low<sup>4</sup>. The average size of Danish fields increased by 7 per cent between 1998 and 2008. A survey of hedges in South Jutland indicates an overall fall in acreage of 6.5 per cent between 1994 and 2007. The numbers cannot be directly transferred to the national level but nonetheless indicate an adverse development in the agricultural landscape<sup>5</sup>.

It should be mentioned however, that many of the hedgerows which have disappeared have been made up of exotic conifer species with little nature value and that many new deciduous hedgerows of native species of trees and bushes have been planted<sup>6</sup>.

In 2008, changed EU agricultural policy led to the re-cultivation of 80,000 ha of former set aside, and this area has increased to about 117,000 ha. in 2009.

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<sup>3</sup> Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

<sup>4</sup> Wincentz Jensen, T. 2009: Identifying causes for the population decline of the brown hare (*Lepus europaeus*) in agricultural landscapes in Denmark. Ph.D. thesis. Danish National Environmental Research Institute, Aarhus University.

<sup>5</sup> Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

<sup>6</sup> Danish Ministry of Environment 2010.

In the period 2006-2009 the use of pesticides in agriculture has increased. The precise quantitative effects on biodiversity is not known<sup>7</sup>.

The agricultural ecosystem has always been important for generalist species, especially large space-demanding species such as roe deer, red deer and birds of prey. While the deer species show a long-term increasing trend, other specialised farmland species such as hare and partridge show significant declines.

Among the positive trends in the agricultural ecosystem are the increasing area of deciduous hedgerows with high frequency of native woody species, the increased number of restored ponds/small wetland patches and the area of organic farming that has resumed a positive trend in 2007 after five years of decline. Also clearing of overgrown nature areas is taking place at some extent, even though these initiatives overall don't seem to match the pace with which the nature areas are overgrown. Moreover, a part of the agricultural land which is taken out of production is restored and becomes nature areas.

Based on the documented trends for farmland birds, for brown hare and for vascular plants of small biotopes, and the anecdotal trends of declining populations of butterflies, bumble bees and beetles, it is reasonable to conclude that there is an ongoing negative trend in the biodiversity of the agricultural ecosystem<sup>8</sup>.

**Read more at:**

The Agency for Spatial and Environmental Planning on the subject of biodiversity:

<http://www.blst.dk/2010/>

Agriculture figures:

[http://www.landbrug.dk/smcms/Landbrug/Baggrund/Tal\\_om\\_landbruget\\_1/Statistik/Index.htm?ID=6491](http://www.landbrug.dk/smcms/Landbrug/Baggrund/Tal_om_landbruget_1/Statistik/Index.htm?ID=6491)

Ornithological news (The Danish Ornithological Association):

[http://www.dof.dk/sider/index.php?option=com\\_content&task=view&id=209&Itemid=239](http://www.dof.dk/sider/index.php?option=com_content&task=view&id=209&Itemid=239)

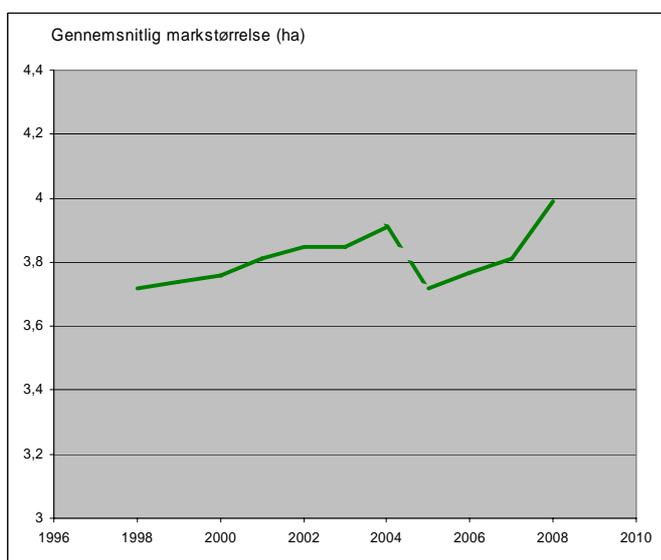
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<sup>7</sup> Danish Ministry of Environment 2010.

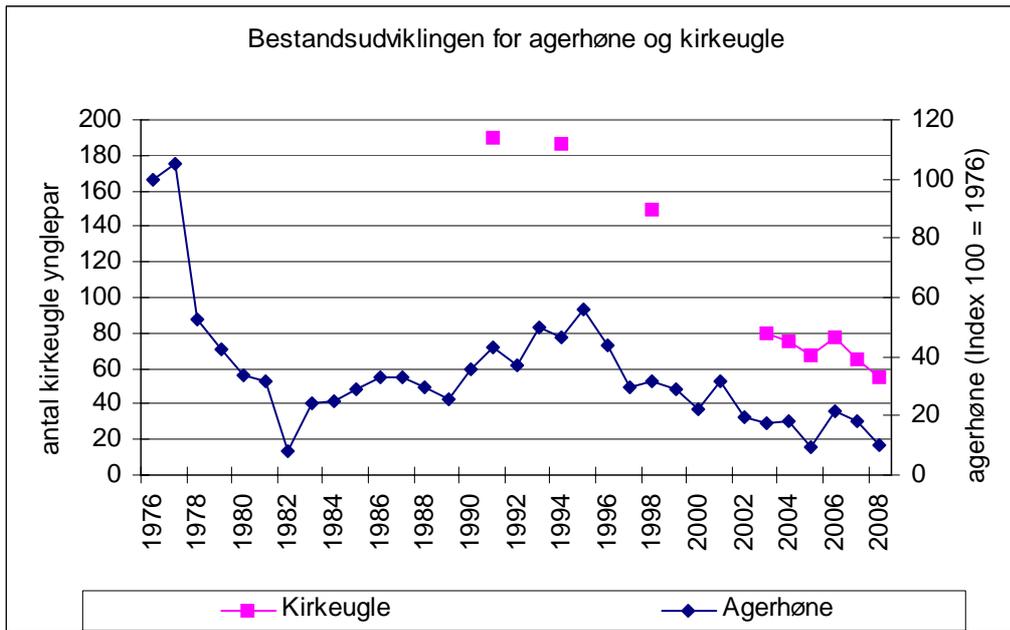
<sup>8</sup> Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet: Overview of Biodiversity Status, Trends and Threats in Denmark.



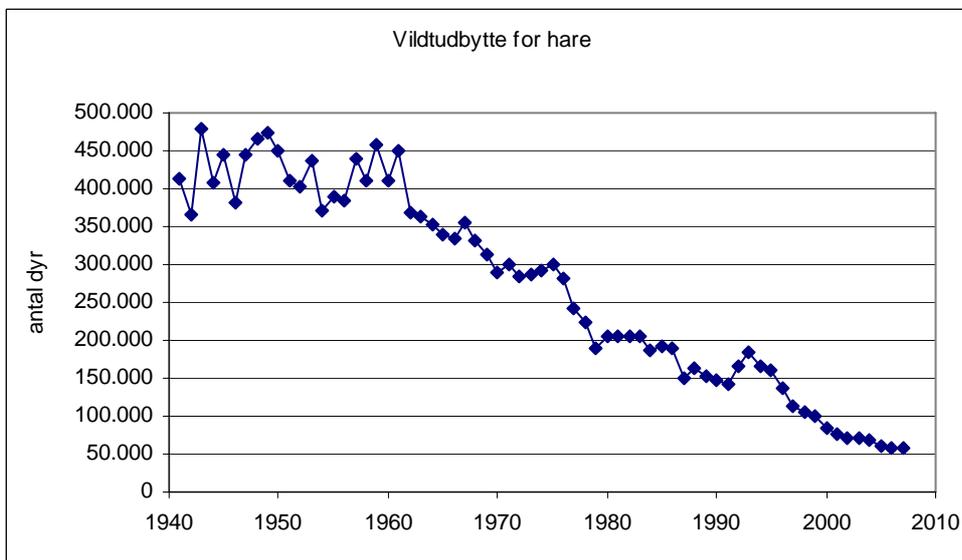
**Figure 1:** The populations of 22 Danish bird species found on arable land (kestrel (*Falco tinnunculus*), partridge (*Perdix perdix*), lapwing (*Vanellus vanellus*), common snipe (*Gallinago gallinago*), skylark (*Alauda arvensis*), swallow (*Hirundo rustica*), meadow pipit (*Anthus pratensis*), blue-headed wagtail (*Motacilla flava flava*), white wagtail (*Motacilla alba*), whinchat (*Saxicola rubetra*), wheatear (*Oenanthe oenanthe*), fieldfare (*Turdus pilaris*), lesser whitethroat (*Sylvia curruca*), whitethroat (*Sylvia communis*), red-backed shrike (*Lanius collurio*), rook (*Corvus frugilegus*), crow (*Corvus corone cornix*), tree sparrow (*Passer montanus*), goldfinch (*Carduelis carduelis*), linnet (*Carduelis cannabina*), yellowhammer (*Emberiza citrinella*) and corn bunting (*Miliaria calandra*). Source: Danish Ornithological Association from: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)*



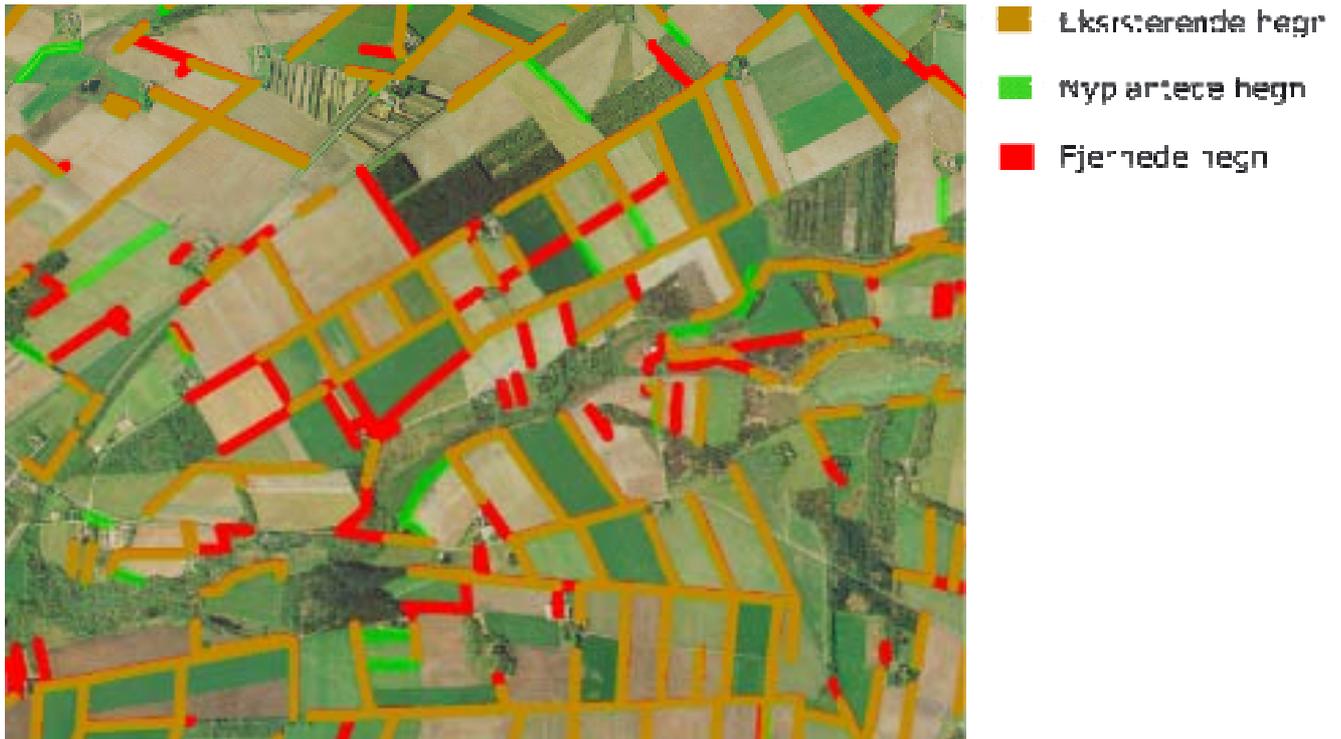
**Figure 2:** Average field size in hectares (ha) in Danish agriculture. The marked drop between 2004 and 2005 was due to a change in the grant scheme allowing grants for fields as small as 0.3 ha. This resulted in the recording of such fields. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)*



**Figure 3:** Changes in partridge (*Perdix perdix*. Blue) and little owl (*Athene noctua*. Pink) populations in Denmark. Source: Danish Ornithological Association from: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)*



**Figure 4:** Changes in official game bag for hares (*Lepus europaeus*) since 1941. The game bag is an indirect indicator of developments. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)*



**Figure 5:** Hedges in a map section near Billund in Jutland. The map shows the changes that occurred between 1994 and 2007. Overall, 6.5 per cent of hedges were removed (measured by acreage) between 1994 and 2007. Corresponding national figures are not available. Yellow: Existing hedgerows. Green: Newly planted hedgerows. Red: Removed hedgerows. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)*

## Open habitats

### Key issues

The area occupied by open habitat types such as commons, heaths, bogs and sand dunes is decreasing. 66 per cent of open habitats have a poor conservation status<sup>9</sup>.

### Factors affecting status

Open habitats are some of the most characteristic of Danish landscapes, including heath, commons, meadow, saltmarsh, sand dunes and bog. Open habitats often need to be grazed or harvested to prevent them reverting to forest. Today, the threat comes from overgrowing and the impact of nutrients. Only limited data is available on national developments in the quality of open habitats and their biodiversity. Environmental monitoring on a national level was established in 2004.

### Current status

Open habitat types are in decline in terms of both area and quality. As a percentage of total Danish acreage, open habitats have fallen from 12.5 per cent in 1965 to 9.2 per cent in 2000 (see also 1.1 Land use). Of the 32 types of open habitat registered in accordance with EU criteria, 21 have a moderate to highly unfavourable conservation status relating to the period 2001-2006, corresponding to 66 per cent<sup>10</sup>. Only 6 per cent have a favourable conservation status. There are moreover seven types of habitat on the EU list of high priority habitats. Of these seven, five have an unfavourable conservation status, whilst the remaining two have uncertain status. The main reason for the unfavourable status of open habitats is overgrowing, nutrient pollution and land drainage<sup>11</sup>.

The majority of the open habitats registered in accordance with EU criteria are also areas protected through the Nature Conservation Act. See chapter 2.

### Objectives

Current knowledge concerning developments in open habitats, including changes in acreage, indicates that these types of habitat are continuing to diminish. The Nature Conservancy Act of 1992 protects meadows, commons, saltmarsh, meadows and bogs of over 2,500 m<sup>2</sup> (known as 'paragraph 3 areas'). Currently, open habitats are protected by law against, for example, ploughing and drainage. However open habitat in general is not protected against overgrowing and nutrient pollution. The aim of the government's agreement on Green Growth in 2009 is to ensure a targeted initiative in Natura 2000 sites and to assure the care of approx. 40,000 ha of open habitat outside Natura 2000 sites<sup>12</sup>.

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<sup>9</sup> Text on "open habitat" comes from: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf), [Supplements to the text are shown in separate footnotes.](#)

<sup>10</sup> Ejrnæs, R., Nygaard, B., Andersen, P.N., Damgaard, C., Jørgensen, T.B., Nielsen, K.E., Petersen, D.L.J., Skriver, J., Søgaard, B., Teilmann, J., Wind, P. 2008: En status over naturens tilstand i Danmark. (*Status report on Danish nature*) DMUnyt (NERI) magazine 12:3. <http://www.dmu.dk/Udgivelser/DMUNyt/2008/3/naturstatus.htm>

<sup>11</sup> Danish Ministry of the Environment: Denmark's contribution to the EU with regard to Article 17 in the EU Habitats Directive <http://biodiversity.eionet.europa.eu/article17>

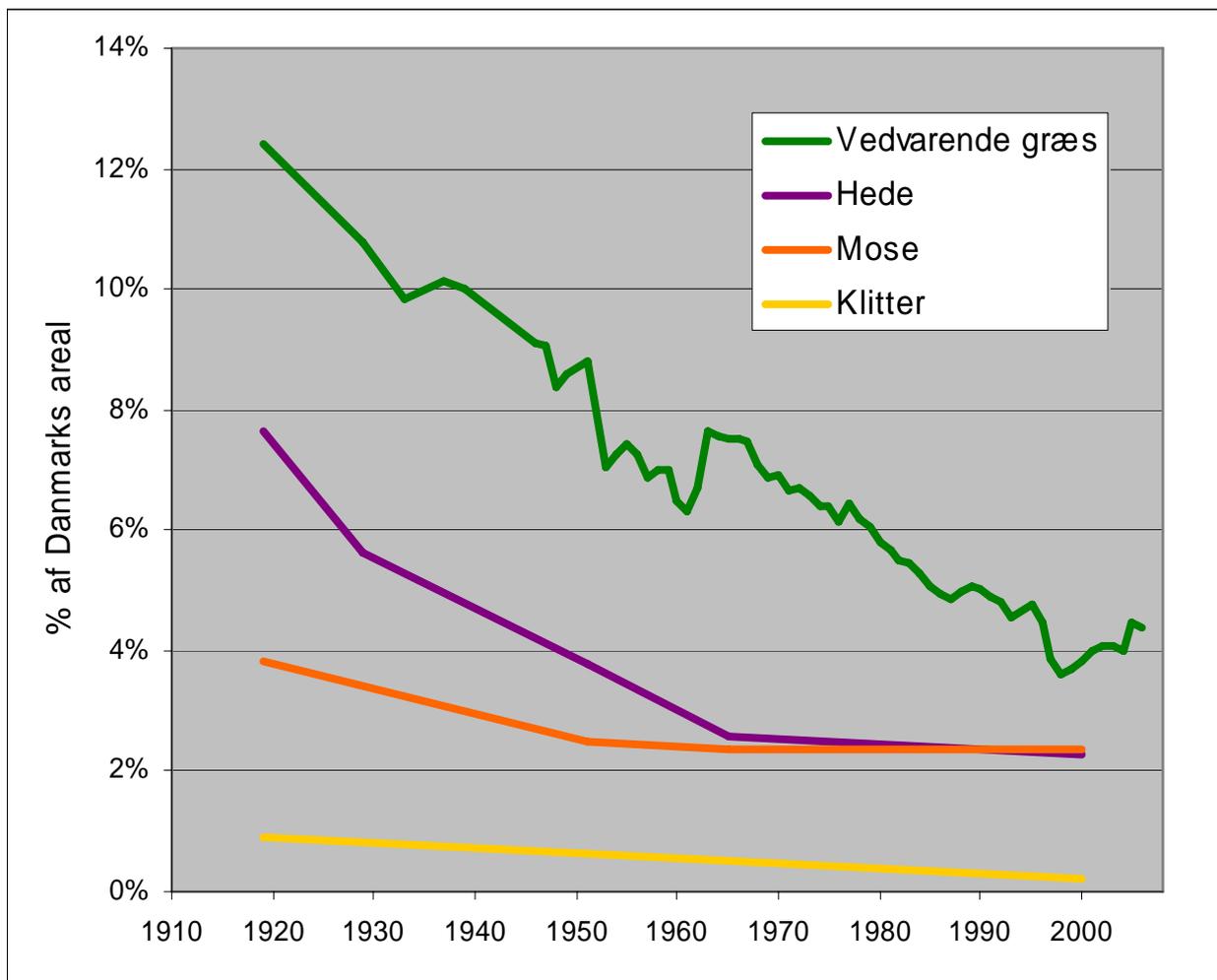
<sup>12</sup> Ejrnæs, R., Nygaard, B., Andersen, P.N., Damgaard, C., Jørgensen, T.B., Nielsen, K.E., Petersen, D.L.J., Skriver, J., Søgaard, B., Teilmann, J., Wind, P. 2008: En status over naturens tilstand i Danmark. (*Status report on Danish nature*) DMUnyt (NERI) magazine 12:3. <http://www.dmu.dk/Udgivelser/DMUNyt/2008/3/naturstatus.htm>

However, overgrowing of seminatural areas which have the status of being arable land is regulated through The Arable Land Management Act. According to this law, no trees or bushes older than 5 years are allowed on such areas<sup>13</sup>.

**Read more at:**

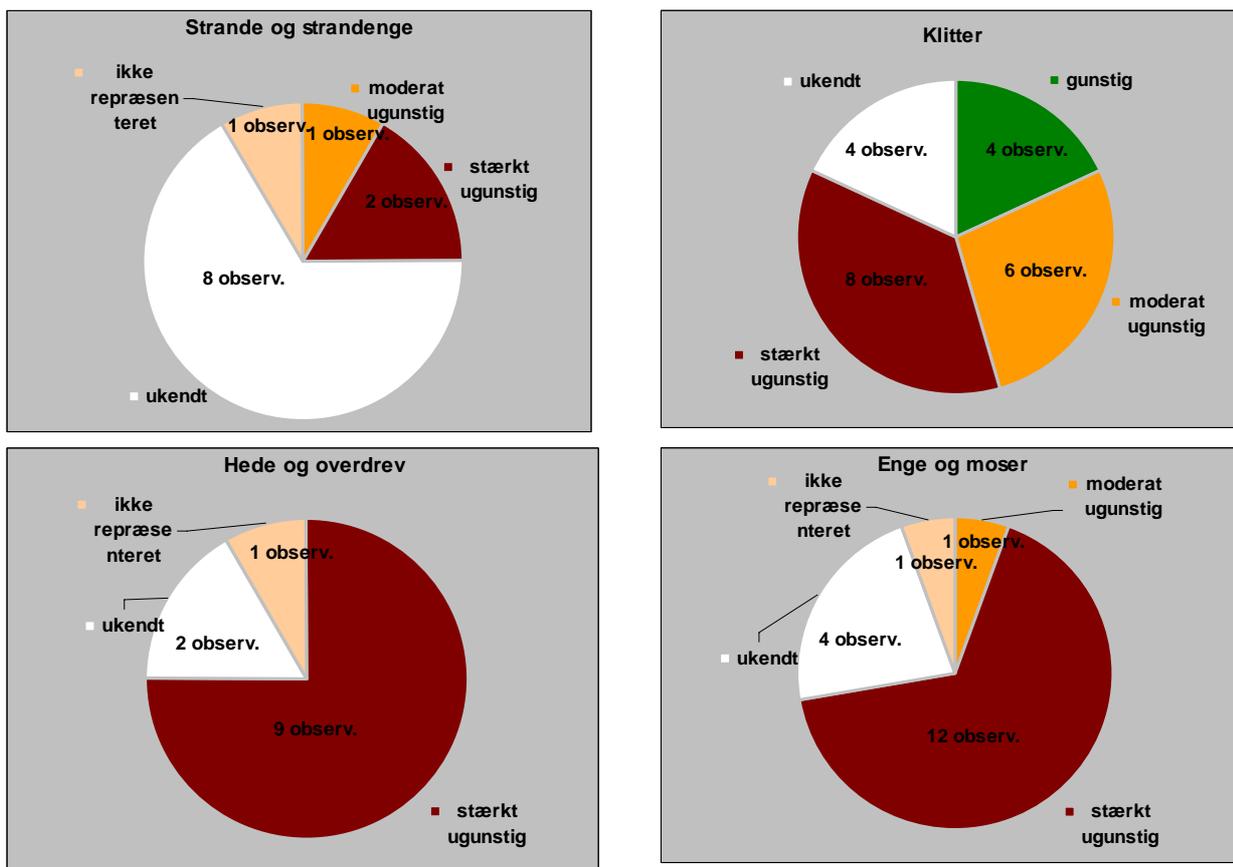
The Agency for Spatial and Environmental Planning on the subject of biodiversity:

<http://www.blst.dk/2010/>



**Figure 6:** Developments in open habitat acreage: permanent grass (pasture, common, meadow, saltmarsh shown in green), heath (violet), bog (orange) and sand dunes (yellow). Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)*

<sup>13</sup> Danish Ministry of Food, Agriculture and Fisheries 2010: Letter to the Danish Ministry of Environment in reply to the hearing of the 4. national country report for Denmark to the CBD.



**Figure 7:** The conservation status for the period 2001-2006 for 32 Danish open habitats in accordance with the EU Habitats Directive. Note that the sum of all the 'slices' is more than 32, as Denmark is divided into Atlantic and continental biogeographical zones. The conservation status with regard to habitat types has been compiled for each of the two zones. One habitat therefore counts as two sets of observations. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

# Forests

## Key issues

The population of 22 species of Danish woodland birds has been stable since 1990. Quality of nature in Danish forests – as measured by the number of old trees, dead wood and undisturbed forest – is low.

The conservation status of 10 different forest types included in the Annex 1 of the Habitats Directive has been reported from Denmark, most recently to the EU in 2007. The general favourable assessment reflects the specific requirements of the EU habitats directive with a particular emphasis on vascular plants. The assessment was completed for the two European biogeographical regions that Denmark has a share of <sup>14</sup>

## Factors affecting status

Large parts of Denmark would still be wooded if man had not influenced the landscape. Danish woods are both deciduous and coniferous with a high proportion devoted to plantation or production forest. There is a lack of knowledge of most woodland species, apart from birds. Some things are known about forest quality in terms of the amount of dead wood, the area of inactive forest and old forestry methods for example. Many species live only in older forest with dead wood, whilst others inhabit clearings.

## Current status

The population of 22 species of native woodland birds such as sparrowhawk (*Accipiter nisus*), robin (*Erithacus rubecula*), wood warbler (*Phylloscopus sibilatrix*) and goldcrest (*Regulus regulus*) increased from around 1980 to 1990 and has subsequently been stable. The volume of dead wood in Danish managed forests is on average 4.7 m<sup>3</sup> per hectare <sup>15</sup>, as opposed to 70m<sup>3</sup> in a natural forest <sup>16</sup>. 73 per cent of forests contain no dead wood. Furthermore, there is a strong bias towards dead wood in early decay classes, a result of continuous removal of dead wood from the forest floor. In deciduous forests within NATURA 2000 the average figures are considerably higher, ranging from 4.4 m<sup>3</sup> in wooded dunes to 30.9 m<sup>3</sup> per ha in acidophilus beech forest with Ilex (median 12.8 m<sup>3</sup>).

The amount of CWD in the majority of Danish forests is thus low compared to current calculations of habitat thresholds for saproxylic species. The most demanding saproxylic species are unlikely to thrive in logged forests <sup>17</sup>

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<sup>14</sup> The text on "forest" comes from: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf) and Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet: Overview of Biodiversity Status, Trends and Threats in Denmark.

<sup>15</sup> Nord-Larsen, T., Johannsen, V.K., Jørgensen, B.B., Bastrup-Birk, A. 2008: Skove og plantager 2006. Skov & Landskab (*Forest and plantations 2006*. Forest and Landscape Denmark) <http://www.sl.kvl.dk/upload/sp2006.pdf>

<sup>16</sup> Christensen, M., Hahn, K., Mountford, E.P., Odor, P., Standovar, T., Rozenbergar, D., Diaci, J., Wijdeven, S., Meyer, P., Winter, S., Vrska, T. 2005: Dead wood in European beech (*Fagus sylvatica*) forest reserves. *Forest Ecology and Management* 210: 267–282.

<sup>17</sup> Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet: Overview of Biodiversity Status, Trends and Threats in Denmark.

The percentage of trees older than 100 years is 25 per cent for beech, 7 per cent for ash and 0.1 per cent for common spruce. Felling, new plantations and a small percentage of undisturbed forest contribute to a relatively low mean tree age. Undisturbed forest is today estimated to account for 7 per cent of Danish forest, but only 1.6 per cent enjoys direct protection as undisturbed forest<sup>18</sup>. Overall, Danish forests are on the increase due to re-forestation.

A survey for the period 2001-2006 shows that out of 9 forest types in Denmark (as specified in the EU Habitats Directive), six have favourable, one has moderately unfavourable, one has unfavourable and two have unknown conservation status.

Habitat type	Assessment Atlantic region	Assessment Continental region
Wooded dunes (2180)	Unknown	Unknown
Luzulo-fagetum beech forest (9110)	Favourable	Favourable
Atlantic acidophilous beech forests with Ilex (9120)	Favourable	Favourable
Asperulo-Fagetum beech forests (9130)	Favourable	Favourable
Medio-European limestone beech forests (9150)	Not present	Unknown
Sub-Atlantic and medio-European oak forests (9160)	Favourable	Favourable
Galio-Carpinetum oak-hornbeam forests (9170)		Unfavourable/Bad
Old acidophilous oak woods with Quercus robur (9190)	Favourable	Favourable
Bog woodland (91D0)	Unknown	Unfavourable/Inadequate
Alluvial forests with Alnus glutinosa and Fraxinus excelsior (91E0)	Favourable	Favourable

**Table 1:** Reported conservation status of 10 forest habitat types in Denmark Source: Official Danish Biodiversity IONET report to the European Union from 2008.

Large living veteran trees (i.e. those old individuals with rotten parts and hollows) are important habitats for saproxylic (decomposing wood) insects and fungi, for epiphytic (growing on tree surfaces) lichens and mosses and for hole nesting birds and mammals. The density of large trees in Danish forests is generally low. In habitat types of the Habitats Directive within NATURA 2000, the mean density is 5 large trees per ha, and the median density 3 large trees per ha.

Forest glades, i.e. open areas inside forests with ponds, fens, meadows, grasslands or heathlands are particularly important sites for biodiversity because many species are adapted to the warm sheltered microclimate and the combination of flowering shrubs and species-rich herb flora associated with such places. Likewise, many epiphyte species are adapted to the combination of high humidity and sunlight found around small wetlands surrounded by forest.

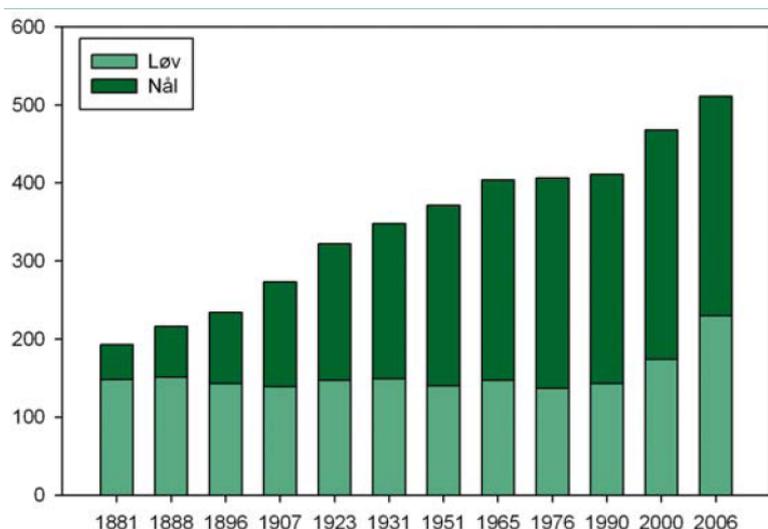
The forest ecosystem must be considered the most diverse Danish ecosystem. The species richness is considerable and so is the number of threatened species. Forest constitute 52% of

<sup>18</sup> Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet: Overview of Biodiversity Status, Trends and Threats in Denmark.

the habitat affiliations for red-listed species (IUCN-categories: NT, VU, EN, CR, RE) in the most recent update of the Danish Red Data Book. Deciduous forests hold most red-listed species, and particularly old growth forest, forest reserves and forest glades. 25% of the red-listed species in forests have habitat affiliations with either of heathland, dry grassland, meadow or mire, stressing the importance for biodiversity of forest glades and ecotones from forest to open semi-natural habitats. Coarse woody debris is a habitat for more than 100 red-listed species in itself. From 2006, 25 selected indicator species of epiphytes and saproxylic fungi selected for their commonness and indicator value for old-growth forest habitats have been monitored in Habitat directive forests within NATURA2000 sites. The indicators were found with an average frequency of approx. 1 species per 1000 m<sup>2</sup> indicating a general scarcity of old-growth habitat.

The forest area in Denmark has been steadily increasing from 1881 to 2006. Until 1990, this increase was entirely due to conifer plantations, but from 1990 and onward the increase has been mainly in deciduous forests and plantations. If the increase in area shall lead to substantially increasing diversity of forest inhabiting species, as the particularly species-rich forest habitats such as forest glades, old-growth forests, wet forests, large trees and CWD, the management have to be arranged properly. Although the forest area increased by approx. 100% from 1800 to 2000, a recent investigation indicates a simultaneous decrease in the area of natural forest with old-growth qualities.

We have no current data-based trends for these habitats, but over the last century, extensive drainage and intensification of forestry for timber production has led to a significant net decrease in open forest glades, forest wetlands and structures related to old growth forests.



**Figure 8:** The trend in the cover of forests in Denmark (1000 ha) from 1881-2006. Løv = deciduous forest. Nål = Conifer forest.

Denmark has no long-term monitoring of species biodiversity in the forest ecosystem. Habitats directive monitoring of forest types started in 2006 and will provide trends for vascular plants and selected indicator species in the future. The only monitored species group for which we can provide long-term trends is forest birds, and for this group a composite index reveals a 16% population index increase from 1976 to 2006, but with a stable trend over the last 15 years. Compared to saproxylic species, ectomycorrhizal fungi and epiphytes, many forest birds may be considered generalists, and may therefore have benefited from the increase in the forest area over the past 15 years.

The lack of monitoring data for species-rich habitat specialist groups of the forest ecosystem, such as epiphytes, saproxylic invertebrates and fungi, ectomycorrhizal fungi and thermophile

invertebrates, means that no firm conclusions can be reached with regard to trends in species diversity of the forest ecosystem. Based on expert judgment however, it is likely that the rare specialist species are declining due to a delayed negative response (extinction debt) to a long-term loss of habitats for these species, and due to a general scarcity of old growth habitats in the forests and plantations of the present day. Common species of birds and plants may be stable or even increasing due to the increase in forest area, a conversion to deciduous forest and increased emphasis on natural regeneration and sustainable forestry.

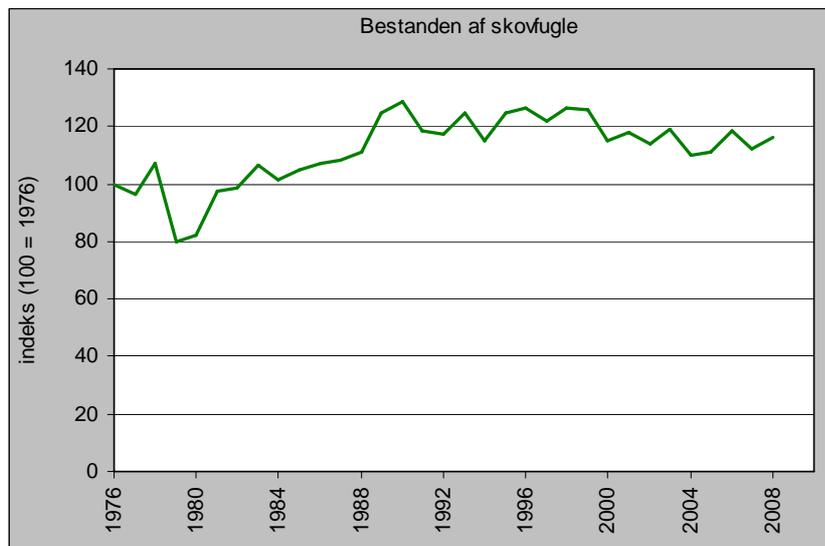
## Objectives

The 1992 strategy for natural woodland aimed to devote 40,000 ha to natural woodland, undisturbed forest and traditional cultivation methods by no later than 2040 and at the same time, nature and biodiversity should be instated as primary goals in 10 per cent of forests by 2040. Natural cultivation methods have been introduced in state forests and these have been certified under two schemes since 2007 (FSC and PEFC). The FSC places strict requirements on sustainable forest management, including the rule that a minimum of three trees per hectare must be allowed to die naturally and that self-regeneration only is permitted. Because of the long-term goals in the natural woodland strategy and the recent introduction of forest certification, it is not yet possible to say how much these rules will impact on biodiversity in the forest.

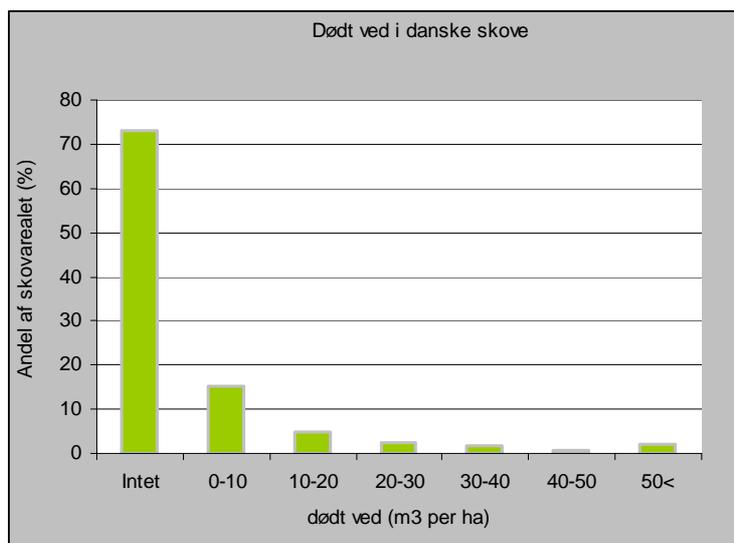
### Read more at:

Forest facts: (Forest and Nature Agency): <http://www.skovognatur.dk/Skov/Fakta>

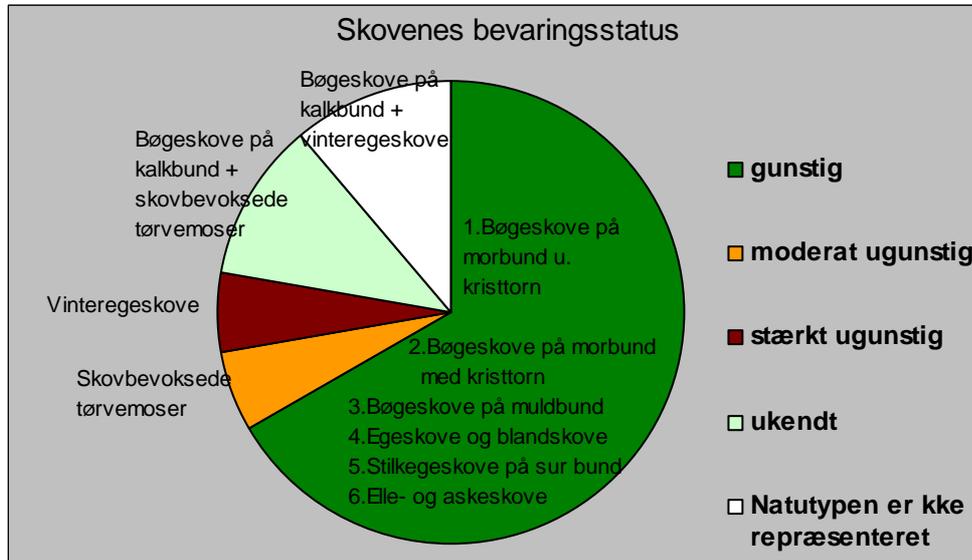
Forest and Landscape, University of Copenhagen: <http://www.sl.life.ku.dk/Emner/Skov.aspx>



**Figure 9:** The 22 species of woodland bird in Denmark (sparrowhawk (*Erithacus rubecula*), stock pigeon (*Columba oenas*), black woodpecker (*Dryocopus martius*), great spotted woodpecker (*Dendrocopos major*), robin (*Erithacus rubecula*), redstart (*Phoenicurus phoenicurus*), mistle thrush (*Turdus viscivorus*), garden warbler (*Sylvia borin*), wood warbler (*Phylloscopus sibilatrix*), chiffchaff (*Phylloscopus collybita*), goldcrest (*Regulus regulus*), pied flycatcher (*Ficedula hypoleuca*), marsh titmouse (*Parus palustris*), crested tit (*Lophophanes cristatus*), coal tit (*Periparus ater*), nuthatch (*Sitta europaea*), tree runner (*Certhia familiaris*), jay (*Garrulus glandarius*), raven (*Corvus corax*), chaffinch (*Fringilla coelebs*), bullfinch (*Pyrrhula pyrrhula*), hawfinch (*Coccothraustes coccothraustes*). Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet.*



**Figure 10:** Volume of dead wood in Danish forest in 2006, measured in m<sup>3</sup> of dead wood per ha of forest. In comparison, a natural forest contains over 70m<sup>3</sup> of dead wood per hectare. Source: Forest and Landscape from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)



**Figure 11:** The conservation status of nine types of forest in accordance with the EU Habitats Directive for the period 2001-2006. The Danish survey of conservation status did not include an assessment of the condition of the volume of dead wood and trees' age. Note that a forest type can have two allocated conservation status results, as Denmark is divided into Atlantic and continental biogeographical zones. The conservation status with regard to forest types has been compiled for each of the two zones. Source: Official Danish Biodiversity IONET report to the European Union from 2008.

## Lakes and watercourses

### Key issues

The conservation status is unfavourable for all five types of lake listed by the Habitats Directive and for one of two watercourse types. The incidence of the most sensitive of small animals in watercourses has risen by 23 per cent between 2000 and 2007<sup>19</sup>.

### Factors affecting status

There are around 138,000 lakes (more than 100 m<sup>2</sup> in area) and around 69,000 km of watercourses in Denmark. Many Danish lakes and watercourses are endowed with a rich supply of natural flora and fauna. The small animals in watercourses include the caddis fly, mayfly and stonefly. They are also known as freshwater fauna and constitute a good indicator of the natural condition of the watercourse and of biodiversity, as they are very sensitive to physical and chemical changes in their habitat. The main threats to Danish watercourses are maintenance, the discharge of sewage and former practices to straighten and dam watercourses. The main threats to Danish lakes come from the introduction of agricultural nutrients and sewage. Over time, an unknown number of ponds have been drained or reclaimed for agriculture and an unknown number of new ponds have been dug<sup>20</sup>.

### Current status

For the period 2001-2006 the conservation status of five types of Danish lakes and two watercourse types, as covered by the Habitats Directive, was found to be unfavourable for all lake types and moderately unfavourable for one of the watercourse types. The second watercourse type received 'unknown' status. In recent years, however there have been marked improvements in species diversity in watercourses. Incidence of the most sensitive small animals (caddis fly (*Trichoptera*), mayfly (*Ephemeroptera*) and stonefly (*Plecoptera*)) increased by 23 per cent in Danish watercourses between 2000 and 2007. Otters (*Lutra lutra*), which live in and near watercourses and lakes, have prospered since the 1980s, when the population re-established itself in much of Jutland<sup>21</sup>.

### Objectives

There are indications in watercourses and lakes that loss of biodiversity has halted. The Water Framework Directive sets the objective of achieving good ecological status in watercourses and lakes by 2015, which means that in general, watercourses should have value 5 on the Danish Watercourse Index of Fauna (see 3.2 Water quality in watercourses). Restoration of watercourses has been extensive in recent years and it is expected that there will be positive effects on conditions. The government's Green Growth agreement of 2009 provides for improvement in the physical conditions of selected stretches of watercourses totalling 7,300 km<sup>22</sup>. The Green Growth agreement replaces the Aquatic Environment Plan III with new objectives. Nutrient input from agriculture into the aquatic environment must be reduced by 19,000 tonnes nitrogen and 210 tonnes phosphorus by 2015. At the same time, there is emphasis on improving treatment processes for wastewater being discharged from towns to open countryside. Lakes are especially sensitive with regard to increased levels of nutrients, so that the objectives are expected to have a more marked effect on lakes than on watercourses.

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19 The text on lakes and watercourses is from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf), unless is stated otherwise.

20 Danish Ministry of Environment 2010.

21 Sjøgaard, B., Pihl, S., Wind, P. 2006: NOVANA. Arter (Species) 2004-2005. NERI Technical report 582.

22 Danish Government 2009: Agreement on Green Growth dated 16 June 2009. Danish Government.

**Read more at:**

The aquatic environment in Denmark (Agency for Spatial and Environmental Planning):

<http://www.blst.dk/Vandmiljoeet>

Book on the aquatic environment (Danish National Environmental Research Institute)

<http://www2.dmu.dk/Pub/MB10.pdf>

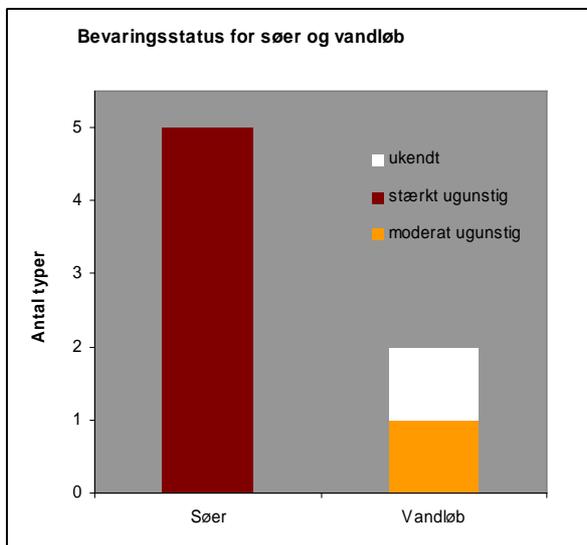


Figure 12: The conservation status for the period 2001-2006 of five types of lake and of two types of watercourse in Denmark listed by the Habitats Directive. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751,*

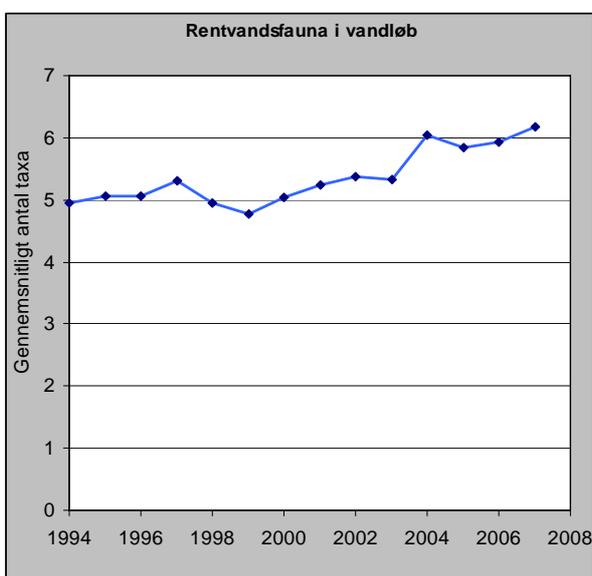


Figure 13: The average number of sensitive insects (stoneflies (Plecoptera), mayflies (Ephemeroptera) and caddis flies (Trichoptera)), the so-called EPT taxa, of 133 watercourse stations between 1994 and 2007. The higher the number, the greater the biodiversity. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751.*

## Coastal ecosystem

The Danish coastal ecosystem is unique and diverse. It is unique because of the 7,000 km long dynamic coast line, continuously reshaped by erosion and deposition, with succession in build up areas, lagoons and salt lakes. Also, the extensive areas of open dunes and salt marshes constitute a major proportion of the European area of these systems. The coastal ecosystem is highly diverse, as most of the variation in inland habitats is also present here, in addition to the specific shifting dunes, shingle beaches and salt marshes<sup>23</sup>.

### Key issues

The coastal zone includes 14 primarily terrestrial habitat types of the Habitats Directive, and the area of these has been estimated to cover 2% of the land area. Conservation status is unknown or not evaluated for 7 types due to lack of data, favourable for 2 types and unfavourable for 5 types.

The coastal zone is particularly important for specialised birds feeding in shallow water, lichens in grey dunes, herbs in dune slacks, saltmarsh and steep coastal slopes and specialised invertebrates and fungi of the open dune and grassland habitats. Approx. 8% of the habitat affiliations for red-listed species (IUCN-categories: NT, VU, EN, CR, RE) in the most recent update of the Danish Red Data Book refer to coastal ecosystems (Anon. 2008), but this is likely to be underestimated, as species-rich habitat types such as calcareous grassland, alkaline fen, xerothermic scrub and coastal slope forest are not included in this estimate.

### Factors affecting status

Among the most important threats to the coastal ecosystem biodiversity is loss of natural disturbance caused by marine and wind erosion as well as cessation of grazing. Climate change imposes an important future threat because expected sea level rise may lead to significant loss of low altitude coastal habitats (see Box 1: Biodiversity impacts of climate change in Denmark. below). Furthermore the protection of private property by the construction or enforcement of dikes may lead to coastal squeezing with terrestrial low-lying part of the coastal ecosystems. Agricultural improvement by drainage and fertilization continues to be a threat to habitat quality and nitrogen deposition is a threat to the infertile dune habitats. In some areas water abstraction and lowered ground water tables may be a threat to ground water fed fens and meadows along the coast.

The expansion of invasive species, particularly *Rosa rugosa* and *Pinus mugo* remains a threat to herbaceous dune and grassland habitats and their associated invertebrate fauna. Disturbance by humans and dogs and predation by fox of remote coasts can in some specific areas be important threats to birds and seals breeding near the coast.

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<sup>23</sup> The text in the section on coastal ecosystem is from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf) and from Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet:

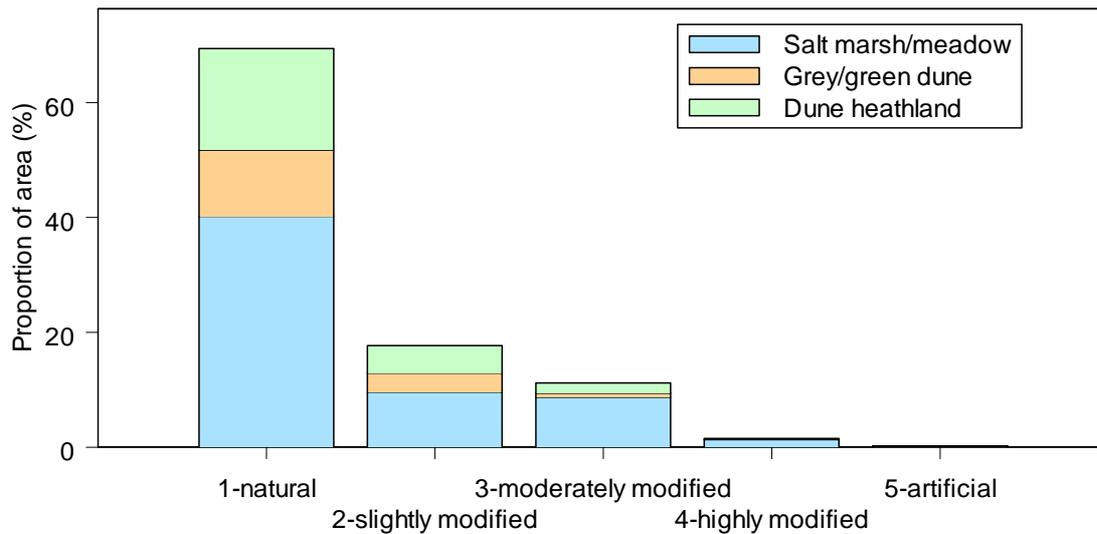
## Current status

Habitat type	Assessment Atlantic region	Assessment Continental region
Annual vegetation of drift lines (1210)	Unknown	Unknown
Perennial vegetation of stony banks (1220)	Unknown	Unknown
Vegetated sea cliffs of the Atlantic and Baltic coasts (1230)	Unknown	Unknown
Salicornia and other annuals colonising mud and sand (1310)	Unknown	Unknown
Spartina swards (1320)	Not evaluated	Not evaluated
Atlantic salt meadows (1330)	Unfavourable/ Bad	Unfavourable/Bad
Embryonic shifting dunes (2110)	Favourable	Favourable
Shifting dunes along the shoreline with Ammophila (2120)	Unknown	Unknown
Fixed coastal dunes with herbaceous vegetation (2130)	Unfavourable Inadequate	Unfavourable/Bad
Decalcified fixed dunes with Empetrum nigrum (2140)	Unfavourable Inadequate	Unfavourable Inadequate
Dunes with Hippophae rhamnoides (2160)	Favourable	Favourable
Dunes with Salix repens ssp. argentea (2170)	Unknown	Unknown
Humid dune slacks (2190)	Unfavourable Inadequate	Unfavourable/Bad
Coastal dunes with Juniperus spp. (2250)	Unfavourable/ Inadequate	Unfavourable/ Inadequate

**Table 2:** Reported conservation status of 14 coastal habitat types in Denmark. Source: Søgaard et al. 2008 from Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet:..

Among the reasons compromising the conservation status of the coastal ecosystem is anthropogenic modifications of the natural dynamic processes involving erosion and deposition by waves and wind. These natural processes create the unique features and habitats of saltmarsh, shorelines, cliffs and dunes.

Grazing is important for the maintenance of species-rich habitats in e.g. saltmarsh, dune slacks and dune grassland. Abandonment of grazing in the coastal zone has led to extensive re-growth and a scarcity of open infertile habitats as well as feeding areas for coastal birds. This process reinforces the dampening of erosion processes by plantations and invasions of invasive conifers and deliberate planting of Ammophila in order to stabilize shifting dunes. Salt meadows have been extensively drained by ditches, protected by dikes and agriculturally improved by fertilization, resulting in species poor habitats of limited value to plants, invertebrates and birds (with the exception of geese and swans).



**Figure 14:** An assessment of modifications of coastal dynamics by coast protection in mapped habitat occurrences inside Natura 2000-areas. Source: Danmarks Naturdata from Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet:.

Over the past 30 years changes in food availability (winter green fields), mild winters and also adaptation of wild species to increased terrestrial foraging, has led to increasing numbers of geese, swans and cormorants in the coastal zone. The development is not positive for all groups of wild birds: while migratory species of the Birds Directive are in favourable conservation status with few exceptions, some breeding bird species are doing less well, especially species confined to semi-natural habitats kept open by grazing – e.g. grassland, heathland, meadow, salt meadow and open mires.

A recent regional investigation of saltmarsh in Funen revealed an extensive decline of rare plant species.

Of 33 investigated red-listed species previously recorded in the region, 8 were found to have disappeared, 22 to be declining and 3 species to be increasing. Common to the increasing species was a lack of adaptation to grazed saltmarsh, 50% of the investigated localities had lost previous populations of red-listed species.

With regard to the invasive scrub *Rosa rugosa*, monitoring of fixed coastal dunes with herb vegetation revealed a significant increase of the frequency of the invasive rose from 2004-2007. This result stresses that the extensive expansion of the rose in the coastal zone over the last 50 years is far from over.

A changing attitude to natural dynamics over the last decades has led to increasing restoration by removal of plantations and invasive conifer scrub in dunes as well as a general relaxation in the construction of physical barriers and maintenance of anthropogenic measures against erosion along the coast line. The full effect of these changes remains undocumented.

## **Box 1: Biodiversity impacts of climate change in Denmark.**

The Danish climate is getting warmer, and forecasts for the future predict a warmer, more humid and windier climate with more storms and more frequent periods of precipitation. The mean temperature has increased by 1 °C since 1870 and is now about 8 °C. During the last century, annual precipitation has gone up by 110 mm to around 750 mm.

According to Denmark's Climate Center, trends toward 2100 show an increase in annual precipitation of 10 to 20% with a clear trend toward wetter winter and increased draught risk in summer. The annual average temperature could be 3 °C to 5 °C higher than today, with greater increases in night temperatures.

### **Productivity**

Primary productivity is predicted to increase in response to climate warming and lengthening of growing seasons, except for the driest habitats, where summer drought may seriously limit production. Increased productivity may aggravate the competitive exclusion of subordinate stress-tolerant plants and their associated herbivore insects, and denser and taller sward will limit the area of warm and sunny open ground, so critical to invertebrate diversity.

### **Forests**

More frequent storms and more severe storms will imply greater risk of windfalls in Danish forests, with a potential positive effect on biodiversity, as biodiversity in Danish forests is restricted by suboptimal amounts of dead wood and open forest glades.

### **Distribution shifts and migration**

If the temperature increases by 3 °C, the natural northern limit for many plant and animal species' natural habitats could move 300 to 400 km to the north. On the other hand, a warmer climate would make it possible for southern plants and wildlife species to migrate to the north. The extent to which this actually occurs depends on the barriers such species meet in the form of farmed fields, urban areas and road infrastructure. Rare species with small and fragmented populations should be predicted to decline, whereas widespread and mobile generalist species, incl. alien invasives will be promoted.

### **The coast**

Anticipated sea level rises of 50 cm up to the year 2100 will increase the water depth locally and trigger or accelerate coastal erosion. According to the Danish Academy of Technical Sciences, the west coast of Jutland between Hvide Sande and Thyborøn could retreat by up to 60 to 70 metres if the erosion is not compensated by more beach feeding. The Wadden Sea including the salt meadows along the southern part of the west coast of Jutland will be seriously affected by the general rise in sea level. Its location outside the dikes mean that the salt meadows and tidal flats will be obstructed from following the coast line as it retreats inland and the natural area will disappear. The same basic process of coastal squeezing may impact other valuable coastal areas in Denmark.

### **The aquatic environment**

Sea temperatures around Denmark are expected to increase by 3 °C to 5 °C in the years approaching 2100. A higher water temperature in the North Sea will also entail the northward migration of southern species. This phenomenon has been observed already for benthic animals around the British Isles over the past 50 years. In Danish marine waters, species such as mullet and rockfish, which prefer a warmer climate, are being observed more and more frequently. Climate change may promote primary productivity and induce more frequent episodes of oxygen depletion, and increased water temperature may completely change the food webs and nutrient cycling in lakes.

### **Adaptation**

Generally the effects of climate change on biodiversity will foremost depend on the adaptation by the human society. The adaptation of agricultural practices to the new climate will be decisive for the nutrient pollution of terrestrial and aquatic ecosystems, and changes in land use and harvesting of natural resources in terrestrial and aquatic ecosystems (outside forestry and farming) may likewise be decisive for the biodiversity of these systems.

# Marine ecosystem and Life on the seabed

## Key issues

Diversity of species and populations of seabed organisms in Danish coastal waters has fallen since 2000.

The Danish marine ecosystem spans the brackish Baltic Sea to the salty North Sea and covers twice the area of the terrestrial territory. Marine waters exhibit considerable variation in depth, salinity, turnover of water and exchange of gases with the atmosphere. Large areas also have restricted water renewal rates and consequently are vulnerable to eutrophication and oxygen depletion. The marine ecosystem provides important habitats for fish, birds, marine mammals, zooplankton, phytoplankton, macro algae and benthic invertebrates<sup>24</sup>.

## Factors affecting status

In Denmark, the seabed is generally soft, but reefs are also common. Reefs in particular harbour rich plant life (seaweed forests). Many Danish reefs have however been destroyed in the past by bottom-trawling or the removal of rock for use in jetties, for instance. The main threats to biodiversity in the sea and on the seabed are pollution by nutrients, bottom-trawling, deoxygenation and climate change. Increasing temperature may for instance speed up oxygen consumption and increase the risk of oxygen depletion in the bottom of the water column. Long-term effects on the marine environment can be ascertained by examining the composition and diversity of seabed organisms.

## Current status

Diversity of seabed creature types in Danish coastal waters has fallen. Samples from 18 stations in the Kattegat and two straits show that species diversity has fallen from 3.7 points in 1994 and 3.0 points in 2000 to 2.3 in 2007, using the Margalef Index of community diversity. The number of species more than halved between 1994 (almost 14 species per sample) and 2007 (6.5 species per sample). This decline is fairly evenly spread across the various groups of seabed organisms, but when considered in terms of numbers of individuals per m<sup>2</sup> of sand seabed, bristle worms emerge as the group which has declined most severely. Figures for organisms living on and near reefs are not available.

Eight habitats of the Habitats Directive are primarily marine, and their habitat distribution is estimated to cover approx. 17% of the marine territory, including the current Danish proposals for supplementary Natura 2000 areas (Table 5). The conservation status was assessed as unfavourable for 6 types, favourable for 1 and unknown for 1 type. The unfavourable assessment is mainly due to low habitat quality caused by eutrophication, oxygen depletion zones and physical disturbances by e.g. trawling or stone fishing. Denmark has a major share of unique marine areas, namely the shallow Wadden Sea the brackish Baltic Sea, and the shallow waters around the Danish islands.

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<sup>24</sup> The text in the section on marine ecosystem is from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf) and from Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet:

Habitat type	Assessment Atlantic region	Assessment Baltic/Continental region
Sandbanks which are slightly covered by sea water all the time (1110)	Unfavourable/Bad	Unfavourable/Bad
Estuaries (1130)	Favourable	Favourable
Mudflats and sand flats not covered by seawater at low tide (1140)	Unfavourable/Bad	Unfavourable/Bad
Coastal lagoons (1150)	Unfavourable/Bad	Unfavourable/Bad
Large shallow inlets and bays (1160)	Unfavourable/Bad	Unfavourable/Bad
Reefs (1170)	Unfavourable/Bad	Unfavourable/Bad
Submarine structures made by leaking gases (1180)		Unfavourable/Bad
Submerged or partially submerged sea caves (8330)		Unknown

**Table 3:** Reported conservation status of 8 marine habitat types in Denmark. Source: Official Danish biodiversity IONET report to the EU.

The most important species are overwintering migratory waterbirds of which a major part of the global flyway populations of several species of swans, ducks and geese use the Danish sea territory and adjacent coasts. Breeding birds feeding on mussels, fish, seaweeds and sea grass in the shallow waters, pelagic fish, algae, benthic invertebrates and marine mammals are also important components of species diversity. Three resident marine mammals of the Danish sea territory are protected by the Habitats Directive, namely grey seal, harbour seal and harbour porpoise. The conservation status of these were assessed as favourable for harbour seal and unfavourable to the two other species of which the harbour porpoise (*Phocoena phocoena*) show a significant declining trend. Species richness of invertebrates in marine areas is very high, in the Danish inner waters, >500 species, although there are major variations between local areas.

Eutrophication of the marine ecosystem has been in decline over the last 20 years, but this decline has not yet resulted in a significant improvement of marine habitats or their species diversity. In general, oxygen depletion zones are still abundant in the inner water bodies, Secchi depth is unchanged, and the vertical and horizontal distribution of sea grass does also not show a positive response. The lack of obvious positive recovery may be due to a significant recovery delay time or the influence of increasing water temperatures. The local species diversity, alpha richness, of the benthic fauna in Kattegat, Øresund and Bælthavet has decreased by 50% during 1994-2007. The cause has yet to be determined, but the reduction is not related to low oxygen concentrations. The possibility remains that it could be due to changes in the cycling and deposition of organic material or to physical disturbances from trawling activities. Populations of water birds feeding on mussel beds and/or sea grasses and sea weed where these remain intact are generally thriving, but the submerge vegetation in several shallow fjords show indications of habitat loss.

## Objectives

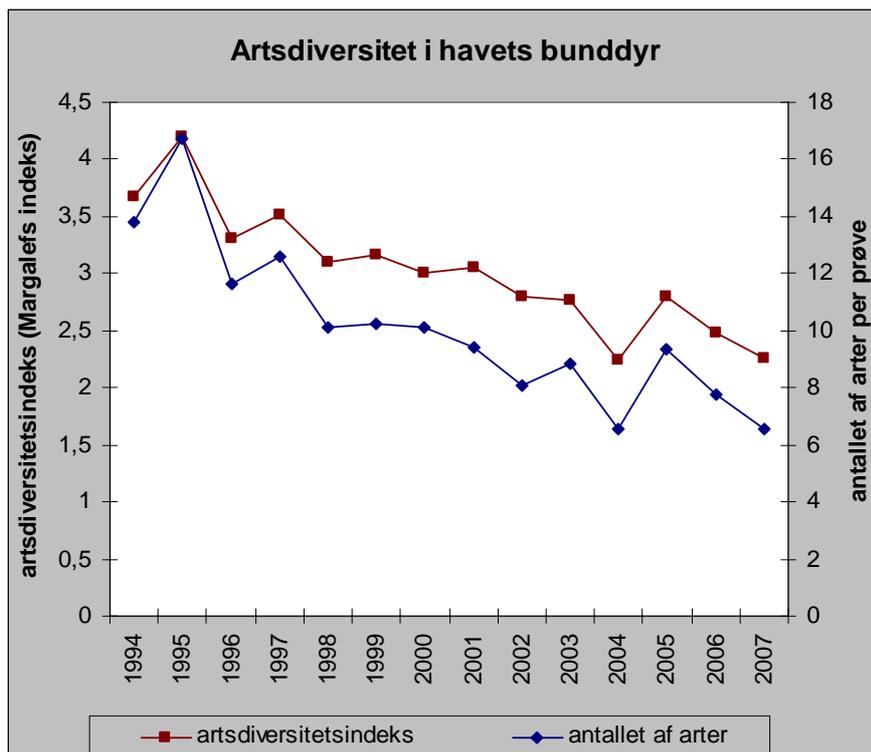
Danish plans for the aquatic environment – which are now incorporated in the 2009 Green Growth agreement – aim to reduce input of nutrients into the sea. This will have a positive effect on the environmental condition of the sea. Monitoring of seabed organisms since 1994 show, that their diversity has halved. This is an indication that biodiversity in the sea is continuing to decline, even though nutrient input has fallen considerably since 1990. The reason for this decline is

unknown. Denmark's largest marine nature regeneration project is being conducted near Læsø<sup>25</sup>. A formerly valuable reef is disappearing due to trawl-fishing. Depositing 95,000 tonnes of stone will create a new reef, 7 ha in area, which will provide new habitats for animals and plants. The project is due to be finished in 2012.

**Read more at:**

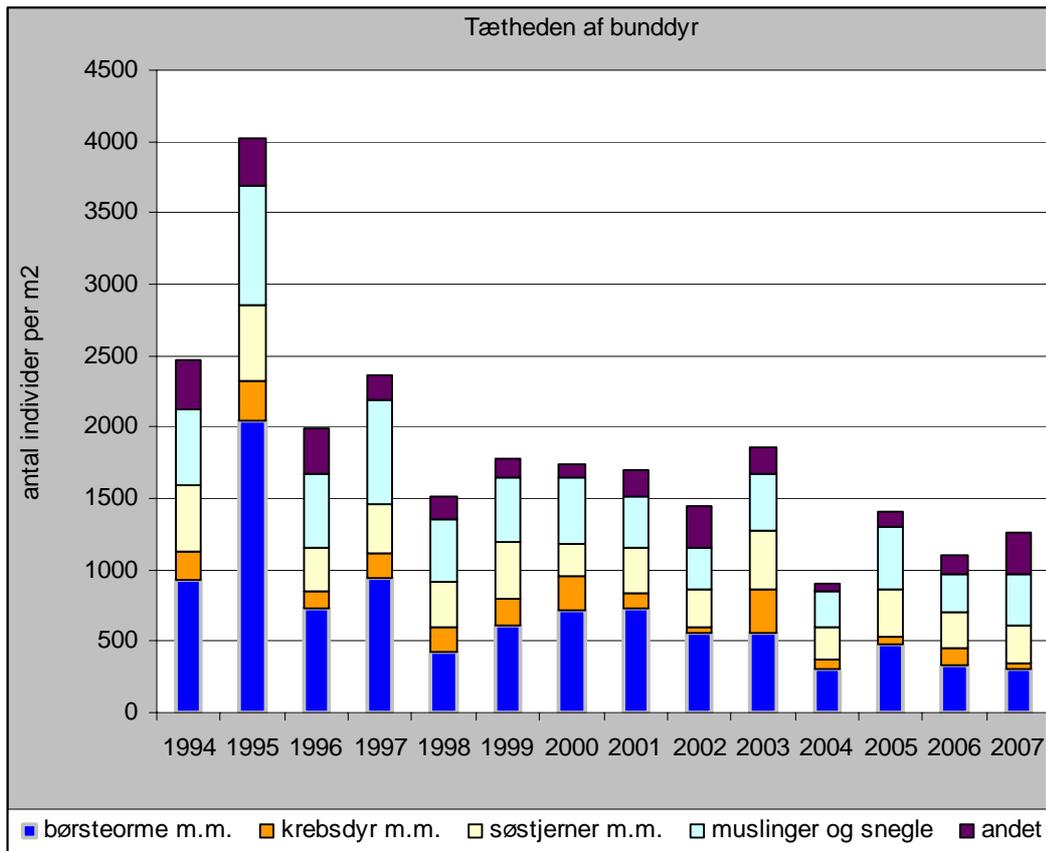
Book on reefs – 'Stenrev – havets oaser' (*Reefs -oases of the sea*):

[http://www2.dmu.dk/1\\_viden/2\\_Publikationer/3\\_miljobib/rapporter/MB02.pdf](http://www2.dmu.dk/1_viden/2_Publikationer/3_miljobib/rapporter/MB02.pdf)



**Figure 15:** Development of species diversity and number of seabed creature species (including mussels and bristle worms) from 18 stations in the Kattegat and two in other Danish straits. Species diversity is depicted using the Margalef Index. The higher the index figure, the greater the species diversity. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)*

<sup>25</sup> The Forest and Nature Agency 2009: BlueReef - Naturgenopretning af huledannende stenrev i Kattegat. (*Natural generation of stone reefs affording habitats in the Kattegat*) <http://www.blureef.dk>



**Figure 16:** Developments in sea creature density in animal groups from 22 measuring stations in open coastal water sites. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

## Threatened species

### Key issues

29 per cent of species under surveillance in Denmark are on the Red List according to IUCN criteria, which means that there is a risk of them disappearing. Around half of the Red Listed species are in forest areas.<sup>26</sup>

### Factors affecting status

Denmark is home to about 30,000 species of plant, fungus and animal. The aim of placing species on the Red List is to evaluate the risk of them dying out in Denmark. The status of many Danish species is thus monitored and species that are threatened, near-threatened or extinct in Denmark are placed on the Red List. It is often these species which are most dependent on living conditions and the condition of the ecosystem. There is a lack of data on the incidence and distribution of many species. Some species' distributions are restricted to Denmark and they can 'naturally' become rare in Denmark due to climatic conditions. These species may be threatened and therefore on the Red List.

### Current status

Currently 6367 species in 8 major species groups have been assessed according to IUCN red list criteria. Of these 1514 or 23,7% have been red listed. Forests and forest structures are the most important habitats for red listed types, as 52 per cent of habitats are forest structure-related (e.g. dead wood and old trees in clearings). The Pearly Heath butterfly (*Coenonympha arcania*), which lives in sunny locations in oak coppices, was last seen in Denmark in 1995 and is thought to have disappeared. The Pearly Heath shares the same fate as other species linked to forest perimeters and clearings, which are threatened because these habitats are under pressure. The white stork is an example of a species that is close to disappearing. In the mid-19th Century, the population was around 10,000 breeding pairs, but since 2000 one, two or no such pairs per year have been seen.

**Table 4:** Status of species which have been assessed in Denmark according to IUCN red list criteria

Critically endangered (CR)		Endangered (EN)		Vulnerable (VU)		Red listed species in total
187 (2,93%)		392 (6,15%)		444 (6,97%)		1514 (23,7%)
Extinct (RE)	Near threatened (NT)	Least concerned (LC)	Data deficient (DD)	Not possible (NA)	Not evaluated (NE)	No of species
168 (2,63%)	323 (5,07%)	3996 (62,7%)	546 (8,57%)	474 (7,44%)	106 (1,66%)	6367 (100%)

<sup>26</sup> The text in the section on marine ecosystem is from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf) and from Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet:

## Objectives

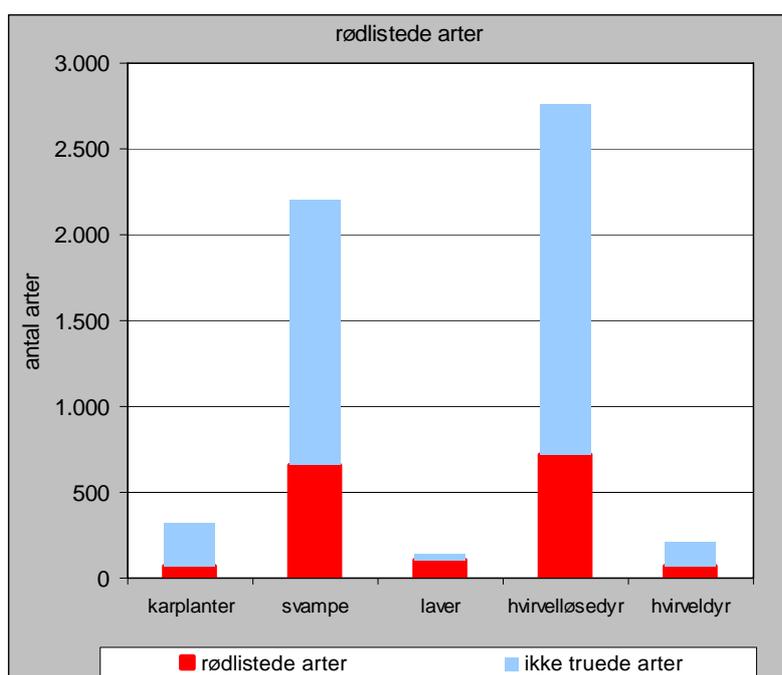
Almost one third of Danish species under surveillance is thus either threatened or extinct. This suggests that the quality and extent of many Danish habitat types are insufficient to protect the species against the risk of extinction and also that certain species only occur in a few locations in the country, as Denmark is on the edge of their area of distribution.

### Read more at:

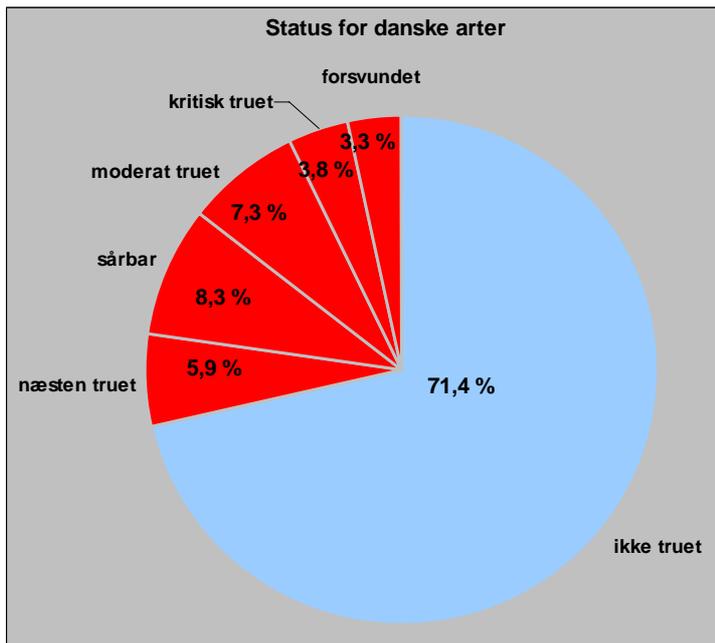
The Danish Red List: <http://redlist.dmu.dk>

Latest update of the Danish Red List (2009):

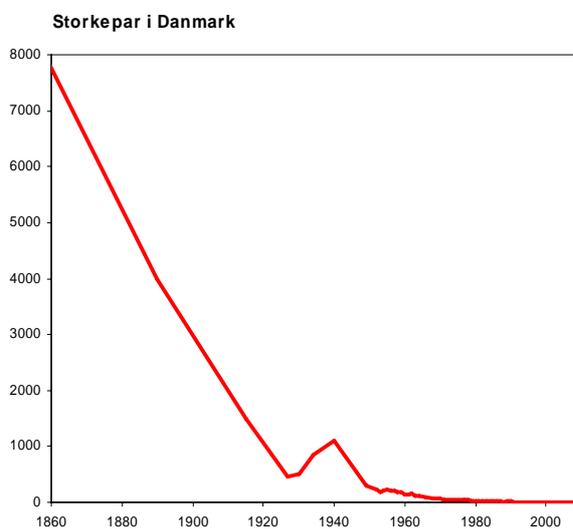
[http://www.dmu.dk/Udgivelser/DMUNyt/2009/2/Roedliste\\_uddyb.htm](http://www.dmu.dk/Udgivelser/DMUNyt/2009/2/Roedliste_uddyb.htm)



**Figure 17:** Numbers of red-listed species (red), (disappeared, critically endangered, endangered, vulnerable and near-threatened) and numbers of non-threatened species by species type (blue). The table comprises 5,656 species. Species for which there is insufficient data are omitted. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)



**Figure 18:** Percentage of species by the various Red List categories. The species were surveyed between 2003 and 2008. The figure covers 5,656 species. Species for which there is insufficient data are omitted. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)



**Figure 19:** In the mid-19th. century the population of white stork (*Ciconia ciconia*) in Denmark peaked at up to around 10,000 breeding pairs. However since 2000 one, two or no such pairs per year have been seen. Source: Danish Ornithological Association and National Environmental Research Institute from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf).

# Atmospheric deposition of nitrogen

## Key issues

Atmospheric deposition of nitrogen on land and sea has fallen since 1990. The critical load of nitrogen for the most sensitive heaths, commons, raised bogs and 'Lobelia lakes' (after *Lobelia dortmanna*) was exceeded during the entire period from 1990 to 2007<sup>27</sup>.

## Factors affecting status

Danish habitat types are mainly defined by the plant community they contain as well as their physical and chemical characteristics. Nutrients, especially nitrogen (N), are a threat to vulnerable habitats such as heath, bog and meadows, because the species which live there are driven out when poor soil conditions cease to prevail. Large amounts of nitrogen compounds (NO<sub>x</sub> and NH<sub>3</sub>) are deposited in the atmosphere from livestock, industry and traffic. Most nitrogen compounds are deposited close to their source, but the wind can also transport emissions some distance from their source. When nitrogen compounds from the atmosphere are deposited on land or water, this leads to increased nitrogen pollution of the plant community and habitats can eventually disappear as a result of changes in species composition. Nitrogen deposits over many years have led to the overloading of Danish ecosystems with nitrogen<sup>28</sup>.

## Current status

From 1990 to 2007, average nitrogen atmospheric emissions on Danish land and sea areas fell by 32 per cent. In 2007, foreign sources accounted for 69 per cent of nitrogen deposition on Danish land areas and 86 per cent on Danish sea areas. Nitrogen pollution of the most vulnerable habitats has been above the critical level for the habitat for several years<sup>29</sup>. The most sensitive raised bogs and Lobelia lakes (which are very poor in nutrients) have a tolerance limit of 5 kg nitrogen/ha/year and this value was exceeded during the entire period from 1990 to 2007. The tolerance limit of 10 kg nitrogen/ha/year for the most sensitive heaths and chalky commons has also been continually exceeded since 1990.

## Objectives

Denmark has undertaken to reduce atmospheric nitrogen emissions by 55 per cent by 2010 in comparison to 1990 (see 2.1 Discharge of acidifying gasses). The government's Green Growth agreement of 2009 sets more stringent requirements with regard to the discharge of ammonia in order to protect especially sensitive habitats from nitrogen<sup>30</sup>.

### Read more at:

Book on Airborne nitrogen pollution: <http://www2.dmu.dk/Pub/MB12.pdf>

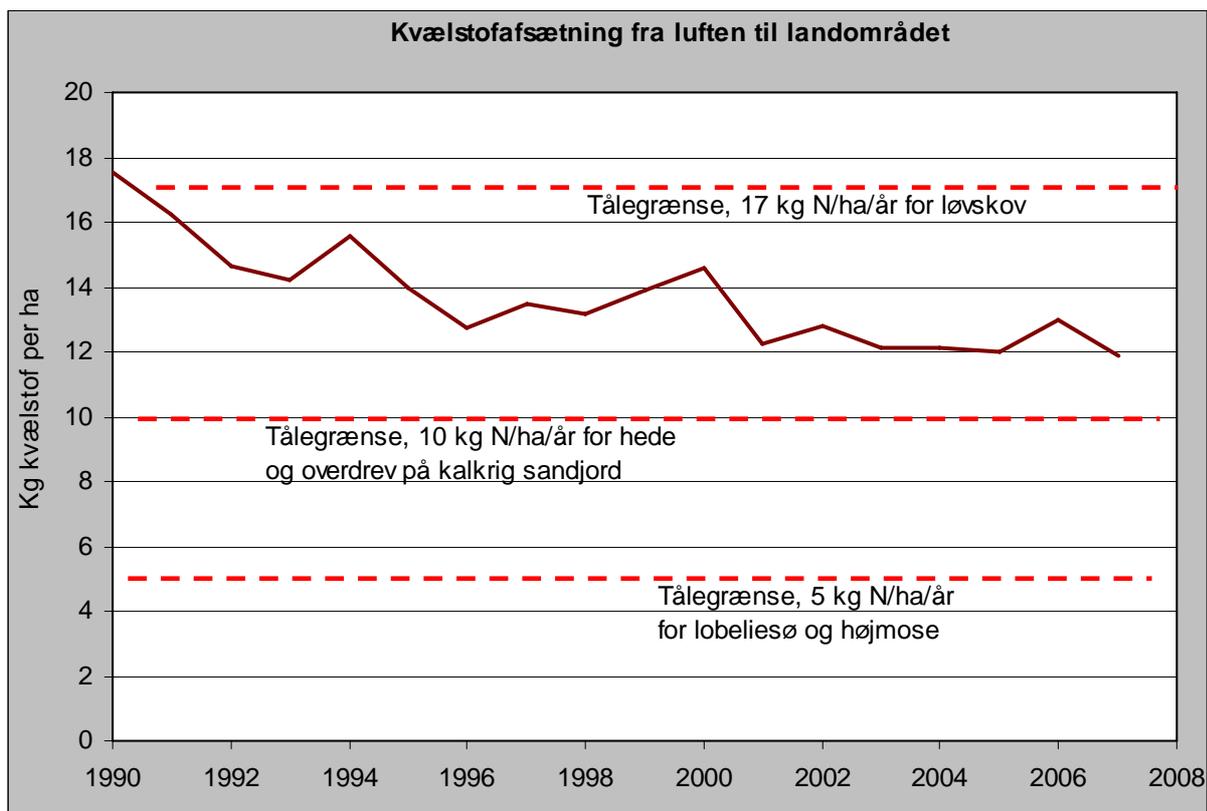
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<sup>27</sup> The text in the section on threatened species is from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

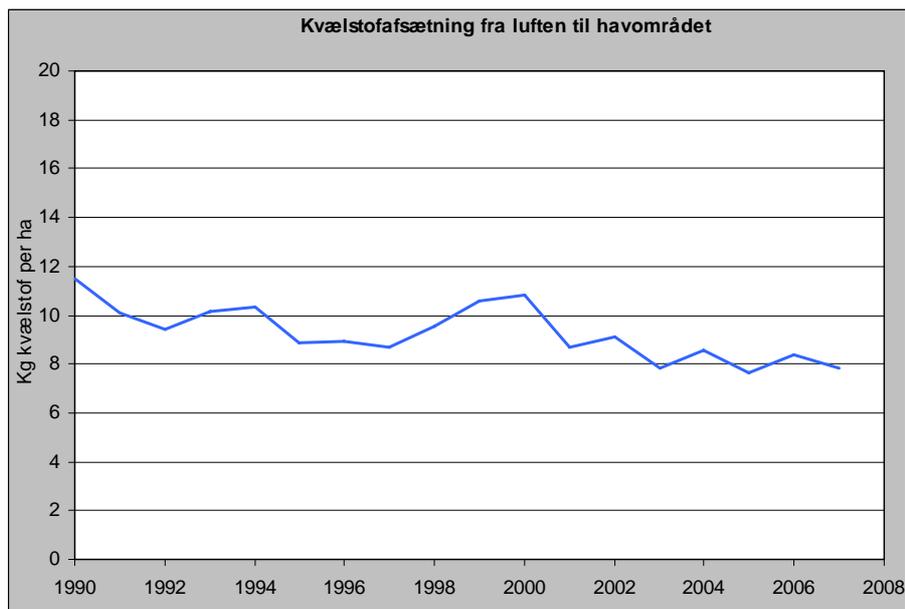
<sup>28</sup> The text in the section on atmospheric deposition of nitrogen is from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

<sup>29</sup> Ellermann, T., m.fl. 2007: Atmosfærisk deposition 2007. (*Atmospheric deposition in 2007*). NOVANA. NERI, University of Aarhus. NERI Technical report 708. <http://www.dmu.dk/Pub/FR708.pdf>

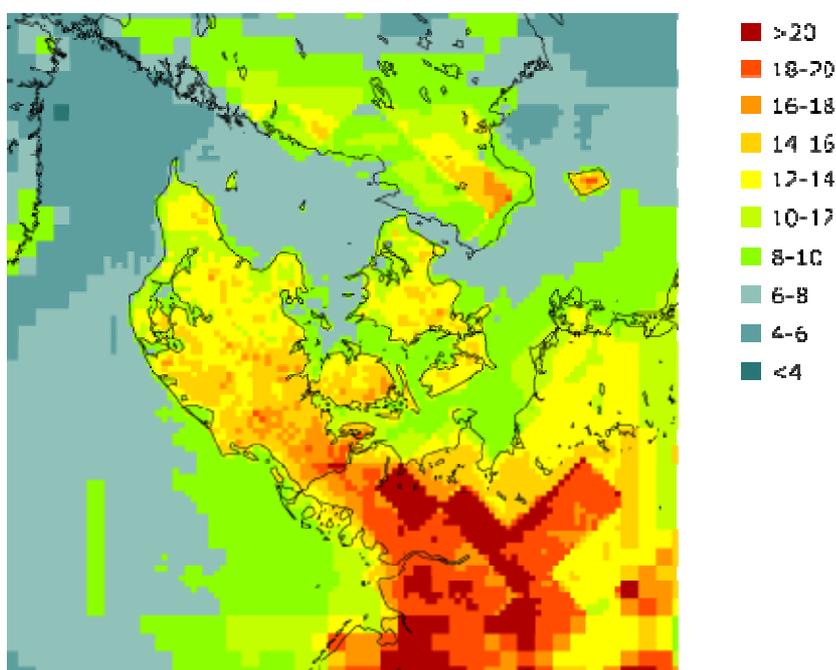
<sup>30</sup> Danish Government 2009: Agreement on Green Growth dated 16 June 2009. Danish Government (Venstre and De Konservative [the Danish Liberal Party and the Danish Conservative Party]) and Dansk Folkeparti [the Danish Peoples' Party] <http://www.oem.dk/sw25655.asp>



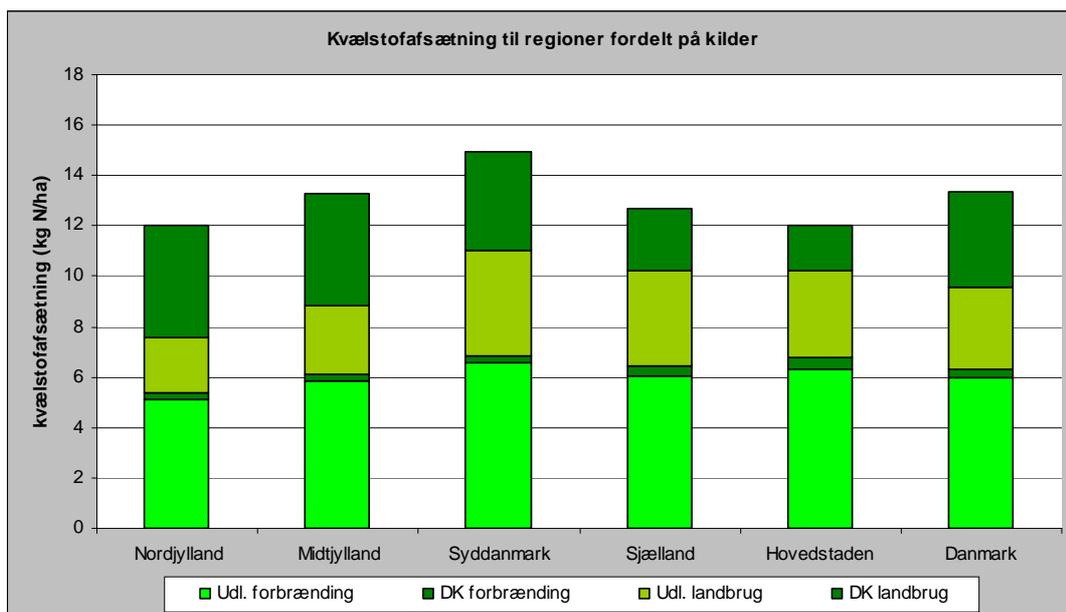
**Figure 20:** Average nitrogen (N) deposition from the atmosphere on Danish land areas. The figure shows critical loads for some of the most sensitive habitats and deciduous forest. For comparison, an ordinary cereal field is fertilized with approx. 150 kg nitrogen per ha per year [http://www2.dmu.dk/Pub/MB12.pdf\(-1311-\)](http://www2.dmu.dk/Pub/MB12.pdf(-1311-)). Source: Danish National Environmental Research Institute and the Forest and Nature Agency from from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751*, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf).



**Figure 21:** Average nitrogen (N) deposition from the atmosphere on Danish sea areas. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf).*



**Figure 22:** Atmospheric nitrogen deposition in kg N per ha in 2007. Based on calculation models. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf).*



**Figure 23:** Average nitrogen deposition on Danish land areas in 2007 by region and source. Source: Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf).

## Case study: Invasive species

### Key issues

Invasive species represent a threat to biodiversity. Species such as the Spanish slug *Arion lusitanicus* and mink affect indigenous species and ecosystems<sup>32</sup>.

### What are invasive species?

It is sometimes difficult to say which animals and plants are Danish and which are not. Typical non-native species which are widespread in Denmark are partridge, giant hogweed, fallow deer, American mink and pheasant. These species' original natural distribution area is outside Denmark and they are thus classified as non-native. Two of them, the Giant hogweed (*Heracleum mantegazzianum*) and the American mink (*Mustela vison*), are categorised as both non-native and invasive species<sup>33</sup>. The definition of an invasive species according to the UN Biodiversity Convention is a non-native species whose introduction and/or spread represent a threat to native flora and fauna.

### From giant hogweed to mink and the lobed comb Jelly

Giant hogweed drives out other plants due to overshadowing. The population of American mink is the result of animals escaping from mink farms and the mink represents a significant threat to local populations of breeding birds and small animals, which it hunts for food. Examples of other invasive species are the Spanish slug *Arion lusitanicus*, the Atlantic jackknife clam (*Ensis directus*), the horse chestnut leaf-miner (*Cameraria ohridella*), the Canada goldenrod (*Solidago canadensis*), the giant goldenrod (*Solidago Gigantea*) and the Japanese rose (*Rosa rugosa*).

Invasive marine species represent one of the most difficult problems. They are almost impossible to combat. The Atlantic lobed comb jelly (*Mnemiopsis leidyi*) and pacific oysters are marine invasive species which are instrumental in upsetting the biological balance in Danish coastal waters. The lobed comb jelly is a threat to young fish, fish eggs and animal plankton. Pacific oysters (*Crassostrea gigas*) can colonise areas which are home to the Danish common or blue mussel (*Mytilus edulis*). They can destroy mussel fisheries and at the same time compromise the main diet of bird species which live on blue mussels.

### Recording of invasive species

An estimated 2,656 species in Denmark are not indigenous<sup>34</sup>. Of these, 63 species are invasive and a further 17 species are known as potential invaders, as they occur in neighbouring countries as invasive species or are present in only limited numbers in Denmark, but could become invasive over time.

Invasive species arrive in Denmark for example as garden plants, in ships' ballast water, by direct introduction, by escaping for example from mink farms and by spreading into Denmark from other countries. Climate change can increase incidences of invasive species in Denmark, as species

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<sup>32</sup> The text on invasive species is from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751. [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf). [Supplements to the text is shown with a specific reference in a footnote..](#)

<sup>33</sup> Danish Ministry of the Environment 2008: Handlingsplan for invasive arter (*Action plan for invasive species*). <http://www.skovognatur.dk/DyrOgPlanter/invasivearter/Myndighed/InvasivHandlingsplan.htm>

<sup>34</sup> European Network on Invasive Alien Species (NOBANIS) 2009: Search in Alien Species database. <http://www.nobanis.org/Search.asp>

that invade countries south of Denmark will be able to migrate further north as a result of rising temperatures.

## **Action plan to halt the progress of invasive species**

The Protection of Nature Act states that the release of animals which are not naturally wild in Denmark is prohibited unless it has the approval of the Ministry of the Environment. In 2004, the International Convention for the Control and Management of Ships' Ballast Water was adopted, with the aim of preventing the spread of organisms from ships' ballast water. The convention has not yet come into force. Denmark expects to ratify the convention in 2011.

The UN Convention on Biological Diversity provides guidelines for member countries to develop strategies to minimise the spread and effects of invasive species. Denmark's first action plan for invasive species was devised in 2009. This action plan recommendations are centred on prevention, control, information and regulation. The objective of the plan is to prevent or minimise the effects of invasive species on biological diversity, the economy and people's health, through for instance the coordinated implementation of international conventions. It is however extremely difficult to completely stop new invasive species, given modern movements of goods and people. Invasive species that cannot be driven out must be controlled in order to prevent spreading and threatening biologically vulnerable areas.

The Danish Arable Land Management Act contains provisions to regulate invasive species. As a consequence, the Giant Hogweed (*Heracleum mantegazzianum*) has been regulated since 2004 according to this law. Today half of the municipalities in Denmark have action plans for combating this weed<sup>35</sup>.

### **Read more at:**

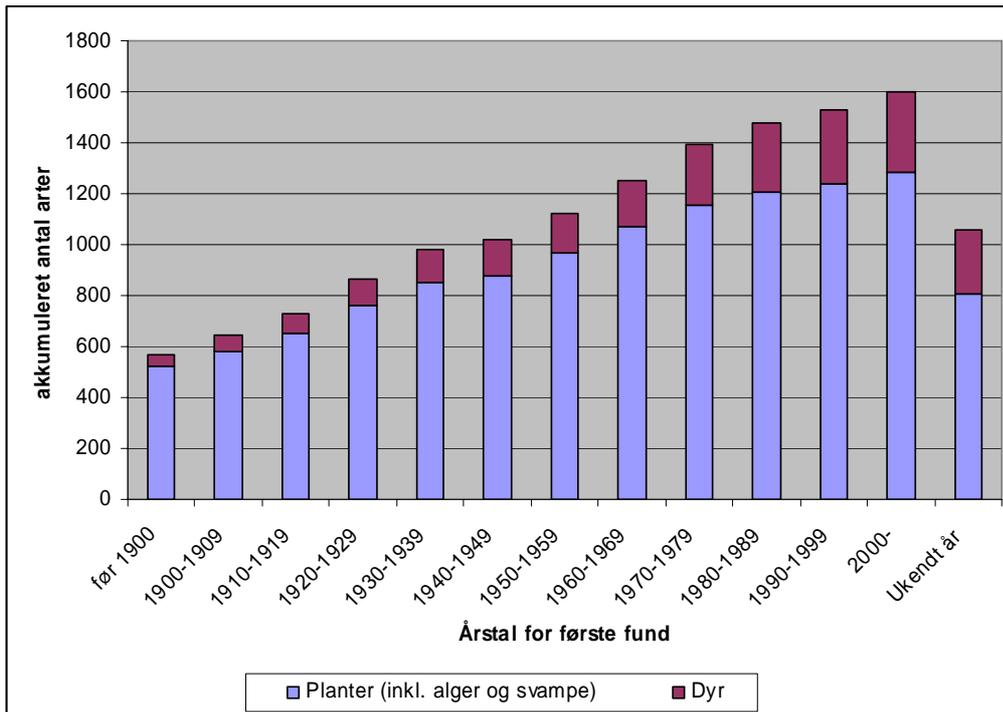
Forest and Nature Agency on invasive species:

<http://www.skovognatur.dk/DyrOgPlanter/invasivearter>

European Network on Invasive Species (NOBANIS): <http://www.nobanis.org>

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<sup>35</sup> Danish Ministry of Food, Agriculture and Fisheries 2010: Letter to the Danish Ministry of Environment in reply to the hearing of the 4. national country report for Denmark to the CBD.



**Figure 24:** Accumulated figures for introduced species recorded in Danish natural habitats, collated according to the year of the first find. Only a small percentage of introduced species are defined as invasive (see text). Source: NOBANIS from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf).*



*The Japanese rose (Rosa rugosa) is an invasive species from northeast Asia which is driving out indigenous plants in significant numbers along Danish coasts. Photograph: Lise Frederiksen (<http://www2.sns.dk/udgivelser/2004/87-7279-540-9/pdf/87-7279-540-9.pdf>) from Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: *Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf).**

## **Chapter 2: Current status of national biodiversity strategies and action plans**

### **Overview of national biodiversity strategies and action plans**

Denmark has outlined its nature conservation policy objectives in a range of documents:

The *National Strategy for Sustainable Development* (2009) sets targets and principles for sustainable development including the objectives of securing a high degree of biodiversity.

The Agreement on Green Growth (2009) is a long-term plan defining environment and nature policies and the agriculture industry's growth conditions.

The *National Strategy on Natural Forests* (1992-2040) has as overall objective to conserve the biodiversity on the Danish Forests, including the gene resources present in these areas;

The *National Forest Programme* (2002) sets targets for increasing the national forest area and managing the forests in a way that takes the protection of the biological diversity better into account;

The *National Strategy on Biological Diversity* (2004) brings together laws and establishes targets for the conservation of biodiversity;

The *Action plan for Biodiversity and Nature Conservation* (2004-2009) specifies actions to protect nature and biodiversity in accordance with the national Strategy and with EU legislation and the Convention on Biological Diversity;

The *Action Plan for Nature Conservation* (2005) specifies criteria for prioritising nature conservation by site of natural landscape or recreational value, when conservation cannot be done by use of other instruments;

The *National Action plan on Alien Invasive Species* (2009) gives a number of recommendations on actions to be taken. The action plan focuses on prevention, eradication, information and capacity building, research and administration.

Some of these plans are explained in further detail below.

### **National Strategy for Sustainable Development (2009)**

In 2009 the Danish government published a National Strategy for Sustainable Development. The strategy contains descriptions on how to deal with the challenges to sustainable growth in Denmark in a globalised world and puts forth the policy and concrete initiatives for a sustainable development. The Strategy focuses on 9 areas:

- Globalisation for the benefit of the whole human population
- Climate change
- Nature for the future
- Green innovation in production and consumption
- Lively, healthy and well-functioning urban areas
- Better health for everybody
- Knowledge, research and education in an innovative society
- Humans as resources
- Responsible, long-term and robust economic policy

## **Action Plan for Biodiversity and Nature Conservation in Denmark 2004-2009**

In 2004, The Danish government approved a national strategy on the conservation and sustainable use of the biodiversity in Denmark. The plan sets out the priorities and proposals for concrete actions in relation to nature conservation and biodiversity.

This Action Plan is the Government's framework plan for Danish initiatives to protect nature and biodiversity in accordance with EU decisions and the Convention on Biological Diversity. The Action Plan is founded on the principle of investing Danish resources where they will lead to more and better nature. In the years to come, efforts will concentrate on the most important natural areas and activities to which Denmark is especially committed. The Action Plan presents the following priorities for future initiatives:

- Danish NATURA 2000 sites (254 EC habitat areas and 112 EC bird protection areas).
- Existing natural areas outside NATURA 2000 sites.
- New small biotopes and semi-natural areas within habitat and bird protection areas.
- New small biotopes and semi-natural areas outside habitat and bird protection areas.

The action plan places great emphasis on the importance of sector integration. Consideration for the environment must be integrated into all sectors of society in order to achieve sustainable development. The following sectors are especially important: agriculture, fisheries, industry, transport, and education. The management of publicly owned areas is also important.

See more: <http://www.dk-chm.dk/convention/document/1118385958>

In the Action Plan each Ministry describe initiatives to be taken by the ministry in the period.

## **Governmental Account to the Danish Parliament on the Nature Policy in Denmark (2006)**

In 2006 presented a Governmental Account to the Danish Parliament on the Nature Policy in Denmark. The account states that the Danish Government wishes more and better Nature areas in Denmark. The account to Parliament has both focus on long-term and short term activities.

The main messages are:

- More and better forests, lakes and other nature areas in Denmark to improve conditions for animals and plants and to create better recreational possibilities.
- There is a common responsibility among all Danes to take care of nature for the benefit of our children and grand children
- Partnerships with civil society are key to achieve the goals.

## **Agreement on Green Growth (2009)**

The government (Venstre and De Konservative [Venstre, the Danish Liberal Party and The Danish Conservative Party]) and Dansk Folkeparti [The Danish Peoples' Party]) have signed an agreement on Green Growth. The purpose of the agreement is to ensure that a high level of environmental, nature and climate protection goes hand in hand with modern and competitive agriculture and food industries. This is an ambitious and long-term plan defining environment and nature policies and the agriculture industry's growth conditions.

A total of DKK 13.5 billion is to be invested in Green Growth until 2015, which is about a 50% increase in investments compared to previous initiatives. These investments will ensure that Denmark meets its environmental obligations fully while strengthening growth and employment.

The Agreement on Green Growth incorporates:

- The Environment and Nature Plan Denmark up to 2020 (see description below). The aim of the plan is to secure not only a better environment and climate, but also more areas of nature of a high quality that are accessible to everyone. The plan not only enables Denmark to meet its obligations under the EU Water Framework Directive and the Natura 2000 Directives but also facilitates follow-up of the Aquatic Environment Plan III and the Pesticide Plan 2004-2009. These investments are conditional on approval by the European Commission.
- A strategy for a green agriculture and food industry undergoing growth. A collective and focussed initiative will be implemented in order to create better framework conditions for a self-sustaining agriculture industry that: will develop dependent on market conditions, will protect the environment and nature, and will deliver green energy.

This Agreement implements the Danish Rural Development Programme (RDP) for 2010 - 2013. The Agreement supports the full repatriation of Rural Development Funds from the EU. An agreement will be endeavoured with the Parties behind the reconciliation on the Environment Approval Scheme for animal husbandry.

### **Environment and Nature Plan Denmark 2020**

The Parties have agreed on the following goals and initiatives:

#### *An aquatic environment of high quality*

19,000 tonne reduction in nitrogen discharge to the aquatic environment from 2010 to 2015  
210 tonne reduction in discharge of phosphor to the aquatic environment from 2010 to 2015.  
Improvement in the physical conditions of selected stretches of watercourses totalling 7,300 km from 2010 to 2015

Re-structuring nitrogen regulation to take into account environmental concerns. Instigation of clarification work to find a workable model based on a system with tradable nitrogen quotas. This clarification work will also compare the advantages and disadvantages of the quota model to alternative methods in order to facilitate determination of any necessary initiatives remaining and selection of the actual model. New nitrogen regulation is potentially anticipated to take effect no later than 1 January 2012. The revenue from trading nitrogen quotas would be transferred to the industry via the land taxes.

Concrete initiatives to reduce the discharge of nitrogen and phosphor to aquatic environments. These will include dedicated measures such as permanent 10 meter wide spraying-free, fertilizer-free and cultivation-free buffer zones and wetlands, as well as general regulation including neutralisation of nitrogen effect when agricultural land is taken out of production. The zones may be used for the production of plant material for bioenergy. However it is only expected to happen to a limited extent. This initiative will be implemented from 2010. An additional initiative will be implemented as part of the River Basin Management Plan targeting storm water overflow and further improvements in treatment processes for waste water from households, industry and sewage works, as well as strengthened protection of groundwater resources.

#### *Substantial reduction in the harmful effects of pesticides on human beings, animals and nature*

Introduction of a new indicator for "extent of burden", which not only includes use of pesticides but also the extent of non-sprayed areas. The indicator will be developed to include in the calculation data on the pesticide burden on health and the environment. The new indicator will replace the previous treatment frequency.

The extent of burden shall be reduced to 1.4 by the end of 2013.

The intention is to submit a proposal in the spring of 2010 for a law on re-structuring of the pesticide tax. This would mean that the least environment- and health-friendly pesticides are

subject to the highest tax while the most environment- and health-friendly pesticides are subject to a relatively lower tax. At re-structuring, consideration will be given to specialist and high value crops to counteract that these are discontinued. Any additional revenue from the pesticide tax will be returned to the industry via reduced land taxes.

Several other initiatives will also be implemented, cf. Annex 1.

#### *Fewer greenhouse gasses*

Reduction of the agricultural sector's emission of greenhouse gasses by an anticipated 800,000 tonnes of CO<sub>2</sub> annually as a consequence of the energy, nature and environment initiatives proposed in Green Growth.

The opportunities for further reduction of emissions from the agricultural sector using a market-based model (quotas/taxes) will be analysed in more detail. This analysis will be integral to a collective, cross-sectional analysis of possible instruments within the European Climate Action and Renewable Energy package for the entire non-quota area. The analysis will be presented in the autumn of 2009.

The government will present a collective, cost-effective climate strategy for the non-quota area up to 2020 based on this analysis.

#### *Improved protection of nature and biodiversity*

The decline in biological diversity shall be stopped.

Several initiatives will be implemented to strengthen the protection of the various types of nature (including drylands), plants and animals in Danish nature, hereunder an initiative for care of nature and management of about 145,000 ha private and public Natura 2000 sites, cf. Annex 1.

#### *More nature and better access to nature*

Funding for establishment of up to a total of 75,000 ha new nature areas until 2015. This includes the 10 meter wide spraying-free, fertilizer-free and cultivation-free buffer zones around certain watercourses and lakes. The 10 meter zones may be used for the production of plant material for bioenergy. In this case, abstention from the use of fertilizers, pesticides and cultivation is not required. However, it is expected that this will only take place to a limited extent.

The countryside shall be more accessible so that increasing numbers of Danes have the opportunity to use and enjoy it, cf. Annex 1.

A special fund will be established for facilities (e.g. signage, tables, benches, etc.) for historic monuments, and voluntary conservation. An internet portal will be established with advice on restoration and dissemination of information about historic monuments. These initiatives will be evaluated in 2013.

#### *Improved planning and monitoring of the environment and nature*

Monitoring the Danish environment and the state of the nature areas will be improved in order to undergird planning of future environment and nature initiatives.

### Compensation of the industry for mandatory nature and environment obligations

The industry will, within the framework of the Rural Development Programme, be entitled to compensation for legislated requirements governing spraying, fertiliser and cultivation-free border zones as well as reduced or ceased watercourse maintenance.

**Table 5:** Total public expenses distributed by investment area, DKK million<sup>36</sup>.

Overview of publicly-financed initiatives	2010	2011	2012	2013	2014	2015	Agg
	2.	2.	2.	2.	2.	2.	13
	23	50	35	22	06	13	.5
Green Growth in total	9	1	0	9	2	9	20
							1.
Water Framework Directive nitrogen and phosphor	30	46	21	21	21	21	61
	8	3	2	2	1	1	8
Water Framework Directive watercourses		13	13	13	13	13	65
	0	0	0	0	0	0	0
Water Framework Directive – non-agricultural initiatives	11						16
	7	9	9	9	9	9	1
Pesticide initiatives	85	84	83	80	78	75	48
							5
	58	69	79	85	76	76	4.
Nature initiatives	9	6	1	3	0	1	45
							0
	19	17	17	17	17	17	1.
Research and innovation <sup>1</sup>	4	4	4	4	4	4	06
							6
The agriculture industry as an energy supplier	16	16	15				54
	3	0	7	20	20	20	1
Environmental approvals, etc. <sup>2</sup>	28	1	1	1	1	1	31
							2.
	35	39	43	43	36	43	41
Organic sector:	2	9	2	1	3	9	7
							1.
Growth in the primary industry and food industry	26	24	22	18	18	18	28
	7	9	4	2	1	1	4
RDP in addition to Green Growth	12	12	12	12	12	12	73
	2	3	4	3	3	3	8
Green Growth - reserve	13	13	13	13	13	13	81

<sup>36</sup> The funds' share of growth initiatives has not been included in the total. Additional administrative costs associated with the Rural Development Programme have been included technically under the individual investment areas or initiatives. <sup>1</sup> The intention is to discuss strengthening research and innovation within the environment and food (GDDP) through distribution of the globalisation funds in the autumn of 2009.

## National Forest Programme

In 2002 the Government adopted Denmark's National Forest Programme, which sets out the current political framework for Danish forestry. The key objective for the development of forestry is development towards sustainable forestry in accordance with internationally recognised principles of economic, ecological, and social consideration. The core of the National Forest Programme is the transition to near-nature forestry based on Danish guidelines for sustainable forestry. It sets out 6 overall objectives e.g. that:

- the Danish forest area must increase to 20-25 % within 80-100 years
- 10 percent of the forest area by 2040 must be operated with biodiversity as the primary aim
- The state must maintain and develop state forests for recreational activities etc.

See more: <http://www.skovognatur.dk/Udgivelser/Tidligere/2002/dns.htm>.

To reach the objective of increasing the Danish forest area 20-25% in 2014, forested land must increase at a pace of around 4000-5000 ha/year, which is more than the average level of the last years. Meanwhile, for the past three years the interest in afforestation has been rising and new subsidy scheme has been introduced. It makes it economically more attractive for private landowners to plant new forest. Other subsidy scheme has developed lately that favours protecting valuable nature e.g. old forest containing broad biological diversity.

A major tool in safeguarding the nature and biodiversity in Denmark is the revision of the Danish Forest Act, widening the framework for forestry and the scope for biological diversity, carried out in 2004. In practice this means that forestry in the future more specifically should focus on natural processes and forest succession. Moreover, special account will be taken of obligations under the Habitats and the Birds Directives.

## Action plan for Close-to-Nature Forestry in Danish State Forests (2005)

An action plan for the introduction of close-to-nature forestry in the state forests (2005) identifies the use of native or other well-adapted tree species, the retention of permanent forest cover by avoiding large clear-cuttings, the use of natural regeneration, development of diverse forest structures, and single tree management as the key principles for the near nature policy. Furthermore it contains a plan for the conversion of Danish state forest into this type of management.

The exploitation of all state forests (25% of Danish Forest) is now environmentally certified according to national FSC and PEFC standards. This confirms the trend towards emphasising non-timber and environmental values, and the relatively extensive management regime of forests probably also favours many of the endangered plants and animals that live in, or have connections with, forest.

See more: [http://www.skovognatur.dk/Udgivelser/2005/Handlingsplan\\_naturnaer.htm](http://www.skovognatur.dk/Udgivelser/2005/Handlingsplan_naturnaer.htm)

## National Strategy on Native Forests 1992-2040

The overall objective of the National Strategy on Native Forests is to conserve the biodiversity on the Danish Forests, including the gene resources present in these areas. The strategy specifically aims at initiatives within the following fields:

- Viable populations of as many species of wildlife, plants and other organisms in forests as possible. The objective must be both to conserve existing populations and to provide possibilities for populations to spread.
- The genetic variation of Danish trees and bushes. Gene resources are protected in order to form a basis for future selection of variants and species for forestry purposes etc. Within this context the strategy will be supplemented by the national strategy for preservation of gene resources.
- Provision of area as a basis for research and monitoring. Untouched forests will allow basic research into ecosystems and studies of dynamics and developments.
- Forestry activities. Future generations must have the opportunity to experience the influence of different forestry activities, ranging from grazing forest, coppice forest, methods which are important in the culture-historical context, to traditional organised forestry.
- The public. Some of the areas, which are reserved for special forest management purposes or as untouched forest, must be selected in order to serve as a resort, which will require a certain minimum size.

The main targets of the strategy are<sup>37</sup>:

- Securing of all native forests on state owned areas.
- Securing of all oak shrubs, grazing forests, coppices wilderness forests.

Before the year 2000, at national level:

- 5000 ha of untouched forest are protected.
- 4000 ha of forest managed according to old management practises is protected.

Before the year 2040, at the national level:

- Approximately 40.000 ha of native forests, untouched forests and forests managed according to old management practises is secured.
- More untouched forests and forests managed according to old management practises are protected as the forest cover increases in Denmark and in proportion to this increase.
- Better dispersal possibilities for the threatened forest animals and plants are secured.
- When public afforestation takes place a part of the afforested area is left for natural succession which may help increase the area of native forest.

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<sup>37</sup> The Danish Forest and Nature Management Agency 2001: The biodiversity in forests, 2. The strategy for native forests (in Danish). <http://www.sns.dk/udgivelser/2001/87-7279-293-0/kap02.htm>

**Table 6:** Status of the implementation by the year 2000 of the targets set in the Danish Strategy on native forests.

	Private forests		State forest	Total
	Agreements according to the Forest Act	Conservation orders <sup>1</sup>		
Untouched	1500 ha	530 ha	4470 ha	6500 ha <sup>5</sup>
Selective logging	1650 ha	(1400 ha)	4600 ha	7650 ha
Grazing	870 ha <sup>3</sup>	(200 ha)	1800 ha <sup>4</sup>	2870 ha <sup>5</sup>
Coppice	50 ha	(120 ha)	180 ha	350 ha <sup>5</sup>
Other		70 ha		70 ha

1) Pending conservation orders are foreseen to add another 1000-1500 ha to the protected forest area.

2) The majority of the area (ca. 750 ha) consists of meadows and dry grassland in connection to forest.

3) Incl. Jægersborg Dyrehave, ca. 700 ha.

4) Private areas with grazing and coppices, where no agreements according the national forest act have been made, are not included.

Figures in parentheses are minimum figures.

## International targets incorporated into NBSAPs

Denmark is pursuing the international biodiversity targets such as the European Council in Gothenburg in 2001 and the similar decision of the Nordic Council of Ministers to halt the loss of biodiversity by 2010 within the EU and the North, as well as the global target to significantly reduce the rate of biodiversity loss by 2010.

Furthermore Denmark is pursuing the European targets to achieve a favourable conservation status for the species and habitat types for which the Natura 2000 areas have been designated and the target to achieve a good ecological status for Danish surface waters and a good status for Danish ground water before 2015.

These targets are incorporated into the NBSAPs mentioned above.

## Area based management and regulation

### Habitats and ecosystem protection in general

Denmark has protected more than 11% of its total land area, through:

- A general protection of certain nature types under the Danish Nature Conservation act' §3 and the Forest Act,
- EU's Natura 2000 directives,
- Nature areas conserved under nature conservation orders
- One third of the protected area is in IUCN category I and II.
- The Danish forest area covers app. 534.500 ha, which equals app. 12,4 % of the Danish territory. The majority of the Danish forests are protected as forest through the National Forest Act. These forests cover 481.385 ha which equals around 11% of the Danish land area. However the forests that are protected as forest through the National Forest Act also encompass large areas of open land or inland waters.
- The open-land habitat types are protected through § 3 in the Nature Conservation Act. Almost 50% of the areas have been designated as EU Natura 2000 sites, which gives them double protection.

Natural habitat type	Area (ha)	Denmark's land area (%)	% situated in Natura 2000 sites
Dry grassland	25986	0.6	23.6
Heath land	82013	1.9	49.7
Freshwater meadows	103722	2.4	56.1
Marshes	89919	2.1	32.6
Coastal meadows	43622	1.0	76.4
Dunes (estimated)	30000	0.7	-
Total	375262	8.7	47.2

**Table 7:** Nature types in the open land, protected by §3 in the Nature Conservation Act.<sup>38</sup>

<sup>38</sup> The figures are based on a preliminary survey and are thus indicative of the real number of ha, the protected nature types cover. Because of the passive protection scheme, areas may grow in and out of protection and the amount of protected area may change over time. Because of overgrowing and illegal ploughing the total area may be decreasing, but it is not verified.

## **Areas protected under the Nature Conservation Act**

### **Protected nature types in the open land**

The Danish Nature Conservation Act protects a range of open land and fresh water nature types, such as dry grassland, Heath land, Freshwater meadows, Marshes, Coastal meadows, dunes, lakes and streams (see Table 7 above). The protection is a passive protection measure as the authorities are not obliged to manage the private owned areas actively. Areas can grow in and out of protection. Some active management is taking place by landowners on a voluntary basis. Local municipalities and the state are obliged to manage public areas actively.

### **Individual site designation**

The Nature Conservation Act gives the authorities a provision to designate individual sites by conservation order.

The total area protected by individual designation orders is approximately 5 %. The total areal of protection is not known precisely because of many overlaps and existence of many old protections. Individual site designation orders may be adopted pursuant to a number of different purposes as laid down in Protection of Nature Act § 1. Among others to protect nature, with its stock of wild animals and their habitats, as well as its scenic, historical, natural science and educational values and to improve, restore or create areas of significance for wild animals and plants and for landscape and historical interests.

Not all protected areas have a management plan and not all plans are implemented to the same extent.

The overall conservation status of the areas protected under conservation orders is not specifically known.

If the local municipalities choose to manage the areas, this must be carried out according to a management plan. The state authorities are obliged to manage the areas on state owned land protected under conservation order.

## **Areas protected under the Hunting and Wildlife Management Act**

Nature reserves can be designated under the Hunting and Wildlife Management Act. The purpose of these areas is to protect wildlife for breeding, resting and foraging, especially birds. Currently Denmark has more than 100 such reserves, covering more than 330.000 ha. Most of these areas are marine (i.e. more than 90%, about 294.000 ha). The rest are found in fresh water (30.000 ha) or on land (7.000 ha).

## **Natura 2000 management plans (2009-2015)**

As part of the Danish implementation of the EU habitats directive and the EU birds directive, Denmark is in the process of making and carrying out 265 action plans for the Danish nature areas included in the EU Natura 2000 network (254 Sites of Community Importance and 113 Special Protection Areas). The network comprises in total 16638 km<sup>2</sup>. Of this 3591 km<sup>2</sup> are on land and 13047 km<sup>2</sup> are in the sea. The Natura 2000 areas on land equal 8,4 % of the terrestrial area of Denmark and the Natura 2000 areas on the sea equal 12,3 % of the marine area of Denmark.

The Natura 2000 action plans will ensure, that the conservation status of the species and nature types which the areas are designated for, will as a minimum not decline further during the first planning period, which runs from 2009 to 2015. On the long run, the plans will ensure a favourable conservation status for the species and nature types in the Natura 2000 areas.

## **Ramsar site designations**

Denmark has designated 27 wetlands, primarily large coastal areas like, as Ramsar sites. The Danish Ramsar sites cover an area of app. 7.322 km<sup>2</sup>. These sites are legally managed as Natura 2000 sites, as there is a 100% overlap between the designated Ramsar sites and the designated Natura 2000 areas

## **River Basin Management Plans**

Denmark has a long tradition for water protection, which goes more than 50 years back. Stemming from obligations in the EU Water Framework Directive, Denmark is in process of implementing River Basin Management Plans, which will cover planning for all of the country. These plans will no doubt improve conditions for biodiversity in Danish marine and fresh water ecosystems significantly in the coming years.

## **National park designations (2007)**

The National Park Act was adopted by the Danish Parliament in May 2007. The National Park Act sets up the rules for the establishment and development of Danish national parks. The objective by establishing national parks is to create large coherent nature areas and to protect and improve nature and biodiversity, cultural heritage and public recreation with involvement of the local public. In June 2007 the Danish Government decided to begin the establishment of a network of national parks and to select Thy as the first national park. Thy National Park was later established in August 2008. In August 2009 the area, Mols Bjerge, was also established as a national park. 3 more areas have been selected - Skjern Å, Vadehavet (Wadden Sea) and Kongernes Nordsjælland. The last three parks will be established step by step over the next couple of years under the condition, that public consent is secured.

Each national park is established by a designation order which determine the boundary and set up the objective and goals for the development of the park. Each national park is governed by a National Park Board which has a major task to elaborate and implement a National Park plan based on a voluntary approach.

## Nature restoration projects

Denmark has a long tradition for nature restoration. Table 8 below shows the amount of new nature on land that has been established each year since 2001.

	2001 - 2006	2007	2008	Total	Wet nature	Dry nature
<b>Private reforestation, incl. open areas – subsidised</b>	6.171	2.376	1.094	9.641	400	9.241
<b>Private reforestation – not subsidised</b>	1.800	300	300	2.400	120	2.280
<b>Public reforestation</b>	480	80	80	640	32	608
<b>Larger nature management initiatives</b>	3.130	495	343	3.968	1.984	1.984
<b>Aquatic Environment Plan II</b>	3.600	600	600	4.800	4.800	-
<b>Other – ponds etc.</b>	1.800	300	300	2.400		
<b>I alt</b>	16.981	4.151	2.717	23.849	7.418	14.031
* Includes meadows, moors, lakes, coastal meadows and etc. based on an estimate.						
** Includes dry grasslands, heath etc based on an estimate						
*** New nature in this category is an approximation						

**Table 8:** Amount of new nature in hectares, established in Denmark between 2001 and 2008.

More than half of Denmark's nature is covered by the sea. Boulder reefs rising out of the seabed support a very high biodiversity like for example large sea urchins and leather corals.

Denmark is in the process of restoring a degraded reef with the purpose of restoring and maintaining a favourable conservation status of the offshore reef habitat with its associated species. The project area is located at Laesoe Trindel, 12 km north-east of the Island of Laesoe. See: [http://www.youtube.com/watch?v=R\\_Mnbgj\\_yjc](http://www.youtube.com/watch?v=R_Mnbgj_yjc)

The project will restore 6,5 ha of marine cavernous boulder reefs and will stabilise 6 ha of the existing reef area or effectively double the area of the habitat. The restoration of the submerged reef structures has been carried out with app. 60.000 m<sup>3</sup> boulders of various sizes each with a weight of app. 1-6 tonnes. The boulders have delivered blasted in a quarry in southern Norway. BlueReef is the first large marine nature restoration project in Denmark as well as the first offshore restoration project receiving 50% co-financing from the European Commission. The project budget is Euro 4.8 million and started the 1st of August 2006 and will finish in the spring of 2012.

The BlueReef project has included various elements of assessments prior to the restoration, the restoration activities and a monitoring programme evaluating the success of the restoration effort. It also includes an underwater video and the establishment of an underwater nature trail for divers.

Offshore cavernous boulder reefs in shallow waters have a high biodiversity and is now a rare and yet biological important natural habitat for a large variety of species like the European Lobster that live in the cracks and crevices between the large boulders. On a national level cavernous boulder reefs in shallow waters have been an extensively exploited habitat targeted for their high concentration of easy to excavate large boulders suitable for constructing harbour jetties and sea defences. A cautious estimate is that at least 34 km<sup>2</sup> of boulders from predominantly shallow cavernous reefs have been excavated from Danish waters or close to 100% of the area of this habitat, leaving an estimated 5 ha untouched.

Laesoe Trindel is a site of European Union community importance and designated as a Natura 2000 Site according to the EU Habitats Directive.

The restored site in Kattegat will provide a significant contribution to maintaining the populations of species which are dependent on the cave-forming boulder reef in Danish waters and function as a crucial steppingstone within a marine corridor linking sites within the Natura 2000 network, as well as being a sanctuary for donor populations.

Besides the establishment of new nature, nature restoration is also taking place in degraded nature areas such as overgrown meadows and dry grasslands, polluted lakes and streams and intensively managed forests. Unfortunately no figures exist on the total amount of this effort.

Forest restoration is for example taking place within the framework of the strategy for natural forests, the Action plan for Close-to-Nature Forestry in Danish State Forests and the National Forest Programme. No figures exist for the actual amount of forest which has been actively restored, as much forest is managed in a less extensive way or left untouched for natural processes to unfold.

Some activities however have been done to actively restore degraded forest systems. This includes efforts to secure more grazing in forests, to close ditches and restore natural water levels, to reforest logged or cultivated areas.

The Danish Rural Development Program, either directly or indirectly via other actions, supports biodiversity in the rural areas:

- Continued promotion of organic and environmentally friendly farming.
- Improved conservation by grazing or cutting on pasture areas and natural lands.
- Establishment and management of wetlands and other kinds of nature projects (see also section on Agreement on Green Growth).
- Establishment of border strips along streams and lakes (see also section on Agreement on Green Growth).
- Establishment of extensive farming in river valleys as a result of periodical flooding (see also section on Agreement on Green Growth).
- Establishment of natural hydrological conditions on agricultural land in Natura 2000 areas (see also section on Agreement on Green Growth).
- Afforestation of agricultural land in afforestation areas (see also section on Agreement on Green Growth).
- Sustainable forestry and non-productive investments in forestry.
- Re-establishment of forests after losses due to storms.
- Nature and environment projects for high nature value areas, including planning of nature.
- Projects and non-productive investments in connection with protection of environment.
- Landscape- and biotope improving plantation, including windbreak hedges.
- Improvement of amenity values and outdoor life in public and private forests (see also section on Agreement on Green Growth).
- Uncultivated strips in cultivated fields.

## **Species management**

### **General species protection**

Some indigenous species are protected under the Nature Conservation Act.

Hunting and game management is regulated through the Hunting and Wildlife Management Act.

Indigenous species cannot be hunted unless the state game authorities give special permission for species and conditions. Currently 45 species can be hunted. Illegal hunting is not considered to be a problem in Denmark. The government subsidises game release if various criteria are met.

Hunting in Denmark is only allowed with a hunting permit. To get a permit one must pass a theoretical and practical test. All persons with a hunting permit must report annually the amount of game which has been caught.

## **Management of species under the EU habitats directive**

Substantive protection of a high number of species, including birds, is explicitly addressed by the designation and management of Natura 2000 sites. These include a number of rare and threatened species, all for which the obligation is to achieve favourable conservation status within the sites.

Furthermore, a large number of other species living in natural habitats and habitats for species, for which the areas are designated, highly gain from this management and protection.

Denmark is also obliged to protect a range of species listed in annex IV of the Habitats Directive. Currently it is believed, that 39 of these species occur regularly in Denmark. Some species are under observation and may become considered as occurring regularly in Denmark, when the matter is evaluated next time. According to the Habitats Directive it is forbidden to destroy or to deteriorate the breeding and resting places of these species. It is also forbidden to disturb these animal species significantly. The plant species in annex IV are protected through a ban on destroying individuals of these species in all their life stages.

Denmark is in the process of amending legislation in order to improve the implementation of these obligations. The government has proposed to further support the strict protection by launching a number of supplementary measures like information of landowners, species action plans and financial support to improvement of habitats of the species.

Moreover Denmark has regulated trade, hunting and collection of a range of species listed in the directives annex V, and for a number of bird species, following from the provisions of the EU nature directives. Furthermore, a large number of species is also from national legislation directly protected from hunting, collection etc.

## Single species management plans

Denmark is currently implementing 13 national species management plans for species of plants and animals. It is envisaged that more plans will be carried out in the near future as a means to implement the nature plans for specific Natura 2000 areas for species on annex 2 of the EU Habitats directive and for species under annex IV of the same directive. As a consequence, on the 14. januar 2010 Denmark has published 246 legally binding nature plans for 254 habitat areas. Most of the Natura 2000 areas have been designated for certain species. The municipalities will be responsible for implementing these plans in the near future and will thus in many instances have to make local plans for the benefit of a range of species. Below is mentioned a few of the Danish species plans.

### **Dormouse (*Muscardinus avellanarius*) action plan (2000)**

The overall objective of the dormouse action plan is to draw attention to the dormouse and its habitat and area of distribution. Together with target the actions to the benefit for the species and to secure its future survival and hopefully increase the size of the dormouse population and distribution. The main tools are monitoring, information and project to make new and improve old dormouse habitats.

### **Corncrake action plan**

A national management plan for Corncrake was launched in 2000, and is now under revision. The main tools are information to farmers, farming subsidies for proper grassland management and identification of the 7 most important Corncrake localities, including special management effort. The Corncrake population has generally been increasing in Denmark since 2000.

### **Action plan on wading birds**

In 2005, a national action plan for threatened meadow birds was initiated. The main focus is to achieve a favourable conservation status for the three most threatened meadow birds of Denmark, Ruff, Black-tailed Godwit and Dunlin. Thus, the 25 most important breeding localities for these three species have been selected for focused action and management. By 2009, a lot has been achieved, also to the benefit of other meadow birds. The Godwit population is now stable or slightly increasing, while the Ruff and the Dunlin are still under severe threat, in spite of strong management efforts.

### **Action plan on red kite**

In 2005, an Action Plan for red kite was established. The plan contains elements grouped under three headings:

- Actions to strengthen the protection of the red kite
- Actions to strengthen the knowledge regarding the red kite
- Actions to strengthen information about the red kite vis-à-vis relevant stakeholders.

### **Management of the butterfly, *Euphydryas aurinia***

In Northern Jutland, the threatened butterfly, *Euphydryas aurinia*, has been surveyed by the local authorities for an extended time period.. This has resulted in the finding of the species on more patches than were known before. Moreover a number of the patches where it occurs are being managed for the species, which apparently has stabilised or increased the population.

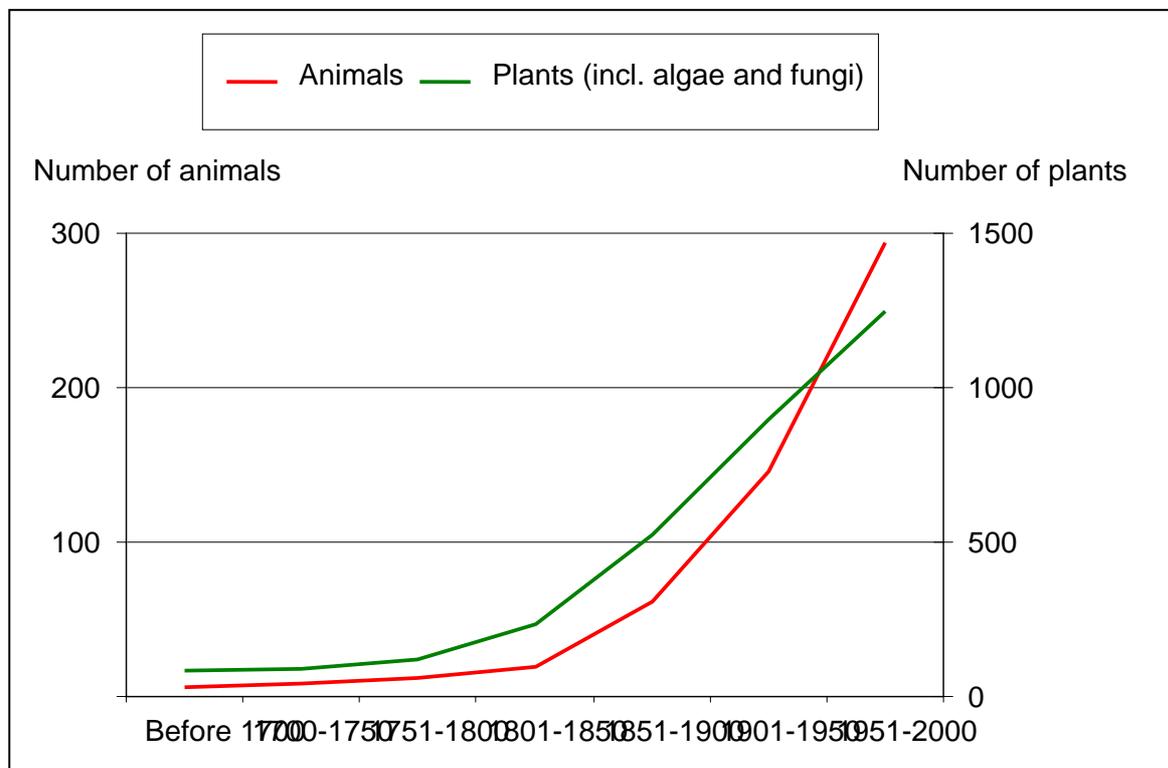
### **Management of the butterfly, *Maculinea arion***

In south eastern Denmark, the threatened butterfly, *Maculinea arion*, is being surveyed extensively on Høje Møn. Some overgrown patches have been cleared for trees and bushes, and the species has spread to more patches and seem to have been stabilised.

## Alien Invasive species management

The number of alien species being found in Danish nature is rapidly increasing as seen in Figure 25 below.

A total of 2635 alien species has been found in Danish nature and more are still coming in.



**Figure 25:** Increase in numbers of invasive alien species of animals and plants, including algae and fungi between 1700 and 2000.

The Action Plan gives a number of recommendations on prevention, eradication, information and capacity building, research and administration. Furthermore the plan contains a black list of invasive species in Denmark, and an observation list of species known to be invasive in other countries in the region.

Denmark is also part of the North and Central European network on alien species (NOBANIS). The network has established a portal where you can find information on all alien species in the 16 participating countries, fact sheets and information on legislation regarding alien species in the countries. For further information see [www.nobanis.org](http://www.nobanis.org).

The Danish Arable Land Management Act contains provisions to regulate invasive species. As a consequence, the Giant Hogweed (*Heracleum mantegazzianum*) has been regulated since 2004 according to this law. Today half of the municipalities in Denmark have action plans for combating this weed<sup>39</sup>.

<sup>39</sup> Danish Ministry of Food, Agriculture and Fisheries 2010: Letter to the Danish Ministry of Environment in reply to the hearing of the 4. national country report for Denmark to the CBD.

## **Reintroductions**

In 1999, Denmark reintroduced European beavers (*Castor fiber*) to Danish water courses. The 18 individuals that were introduced have now multiplied to over 100 individuals and spread to new water systems.

In the autumn of 2009 beavers have been introduced to water courses in the Northern part of Sjaelland.

Denmark is currently contemplating to reintroduce more species which are nationally and locally extinct.

## **Genetic resources management**

### **Natura 2000 plans**

The EU habitats directive does not demand that the EU member states manage the areas explicitly for the conservation of genetic diversity. However, many of the plans include activities which aim at minimizing inbreeding depression and maximising connectivity between isolated habitat patches through a conservation or enhancement of the genetic diversity in the areas.

### **Genetic diversity of forest trees**

Denmark is managing genetic resources of trees and bushes of primarily commercial value to society in general and to forestry. This takes place through a programme that ensures collection of seeds from locally adapted and native Danish forest trees and bushes and a policy of using this plant material in reforestation activities.

### **FAO and Genetic resources (2001)**

In 2001 Denmark ratified the International Treaty on Plant Genetic Resources for Food and Agriculture and in 2007 Denmark ratified the Interlaken Declaration on global action plan for conservation of animal genetic resources.

### **National strategy on gene resources in farm animals and plants (2003)**

#### **Genetic resources for food and agriculture**

The Ministry of Food, Agriculture and Fisheries (MAFF) is responsible for conservation and use of genetic resources for food and agriculture.

#### **Plant genetic resources for food and agriculture**

In 2004, a strategy for future work on plant genetic resources for food and agriculture was published. It has been followed-up by action plans which guide MAFF's activities on plant genetic resources for food and agriculture. The current action plan covers the period 2008-10 and contains activities on conservation and use of plant genetic resources as well as awareness-raising and research. To guide its activities, MAFF has established a plant genetic resources advisory board where relevant stakeholders are represented.

#### *National and Nordic activities*

##### a ) Ex situ conservation

Plant genetic resources for food and agriculture are conserved both ex situ and in situ. In Denmark, vegetative propagated material like fruit and berries are to a large extent conserved in national clone archives, whereas seed propagated material is conserved in the joint Nordic gene bank, NordGen. NordGen is an institution under the Nordic Council of Ministers. Nordic cooperation plays a very important role in the field of genetic resources for food and agriculture.

b) In situ conservation

A large number of wild or weedy Danish species are related to crop plants and are thus plant genetic resources for food and agriculture. A list of high priority species has been selected and the status of conservation of these species is currently being assessed.

c) Legislative matters

Within the EU regulation on rural development, Denmark has made a scheme to support conservation and use of old crop varieties. Legislation allowing for the marketing of old crop varieties has also been implemented.

*International activities*

Denmark has ratified FAO's International Treaty on Plant Genetic Resources for Food and Agriculture and participates in meetings of its governing body. The treaty's access conditions are applied to plant material in NordGen.

Denmark is member of the European Cooperative Program on plant genetic resources, ECPGR, and Denmark is also involved in various EU-activities relating to plant genetic resources.

**Animal genetic resources for food and agriculture**

Every fourth year, the Danish Minister for Food, Agriculture and Fisheries appoints a Committee for farm animal genetic resources (FAnGR). The Committee takes care of and coordinates all governmental efforts on FAnGR in Denmark, including Gene bank, support and information activities.

In 2009, a new Strategy for the future work (2009-2012) on FAnGR for food and agriculture was prepared by the Committee. The Strategy consists of a Vision, 7 measurable Objectives and 14 Action Plans for 14 specific areas. The Strategy is structured in accordance with the 4 Strategic Priority Areas, which can be found in FAO's Global Plan of Action for Farm Animal Genetic Resources *and* Interlaken Declaration from 2007.

*National activities*

a) Ex situ conservation

Farm animal genetic resources for food and agriculture are conserved both ex situ and in situ. The Danish Gene bank is managed and financed by the Committee for FAnGR, and it contains semen from all bulls, boars, stallions, billy goats and rams of endangered breeds and embryos from endangered cattle, pigs and sheep. Each year, new material is collected and stored in the Gene bank.

b) In situ conservation

In Denmark, around 150 breeders (private and public) participate in the in situ conservation of the endangered Danish Breeds. The Committee supports the endangered breeds every year, by providing the breeders with national funds. Furthermore, support is provided to approx. 20 beekeepers and their organization engaged in the breeding of the small, remaining population of the black (*A. m. mellifera*) subspecies of honeybee.

c) Legislative matters

The Committee has made a national scheme to support the endangered breeds and the various small societies for breeders.

*International activities*

In September 2007, Denmark adopted FAO's Global Plan of Action for Farm Animal Genetic Resources *and* Interlaken Declaration and participates as member of FAO's Commission for Genetic Resources for Food and Agriculture in its meetings – the latest was CGRFA-12, which

was held in October 2009. Denmark is also represented at meetings arranged by the European Regional Focal Point for FAnGR.

Recently, the Danish National Coordinator for FAnGR became a member of the expert group under NordGens division for Farm Animal Genetic Resources, which gives advice to NordGens Board..

## **Chapter 3: Sectoral and cross-sectoral integration or mainstreaming of biodiversity considerations**

### **Legal and institutional framework**

The following laws create the legal framework for nature and biodiversity conservation in Denmark. The Nature Conservation Act provides Denmark's main legislative framework for nature conservation. It comprises four pillars: general protection for habitats; coastal zone protection; land acquisition and specific regulatory powers for the protection of nature. Natura 2000 and Ramsar sites are established under this act. It protects: natural lakes over 100 m<sup>2</sup>, watercourses that have been designated as protected areas, heaths, bogs, moors, salt marshes, swamps, coastal meadows, humid permanent grassland and uncultivated dry grassland of more than 2500 m<sup>2</sup>.

The Forest Act allows for the protection of natural forests in both state forests and privately owned forests. The Planning Act offers protection of the open land and coasts. It is realised through national plans, regional plans, municipality plans and specific local plans within municipalities. These plans may contain provisions for green corridors and afforestation areas. The Hunting and wildlife Management Act regulates the hunting of game species and permits the designation of protected areas for wildlife and birds.

The Environmental Liability Act regulates for the prevention and remediation of environmental damage (or the imminent threat of such damage) to biodiversity, water, protected species and habitats. It introduces a regime of strict liability for the polluter with an obligation to remediate the damage.

The Marine Environment Protection Act allows the Ministry of defence to take action in case of an oil spill that could inversely impact the marine environment, including Natura 2000 and marine reserves. The Fisheries Act aims to protect the marine resources and areas by setting aside spawning in marine species habitats. Under this act, quotas to limit the fishing of fish or shellfish species may be established. The Act on Environment Objectives sets out the framework for protecting water bodies from deterioration and for the planning and future management of international nature protection areas.

Several other laws have an important but indirect impact on nature and biodiversity conservation. These include the Acts on: Environmental Assessment of Plans and Programmes; Operations; Fertilisation; Watercourses; Environment Protection; Rural Development Support; Environment and genetic Engineering.

The Ministry of Environment co-ordinates the implementation of the Action Plan for Biodiversity and Nature Conservation (2004-2009) and is responsible for ensuring compliance with the National Strategy on Biological Diversity. As such, it is responsible for the conservation and restoration of endangered species, including the genetic variation within wild species. The ministry is in charge of the conservation of EU habitat and bird protection areas as well as the development of economic instruments and environmental indicators to support conservation. Through the Forest and Nature Agency and the Agency for Spatial and Environmental Planning the ministry manages important habitats. It is also responsible for international negotiations on nature conservation. The Ministry of Environment is also responsible for administering the subsidies to the forest sector, including those that promote biodiversity in forests. These subsidies include private afforestation, reforestation, close to nature management and green forest planning.

The Ministry of Food, Agriculture and Fisheries is responsible for assuring the sustainable management of marine and freshwater fisheries. Also, via the National Land Fund, the ministry manages certain kinds of nature restoration and afforestation projects and areas with special

natural assets. It is responsible for the conservation and sustainable use of farm plant and animal genetic resources.

## **Spatial Planning**

The Planning Act (1992) applies to all of Denmark's land and coastal areas but not its marine area. Since 1971, the public administration has been based on a division of responsibility between the national, regional and municipal levels. At the national level, the Minister of Environment presents after every parliamentary election a national spatial planning report with policy guidelines for national territorial development. This report aims to ensure that the planning synthesises societal interests with respect to land use and contributes to protecting the country's nature and environment. The regions deal mostly with hospitals and have only a marginal role in relation to environmental protection. Municipal planning governs comprehensive municipal planning, detailed local planning and permits for construction and changes in land use in rural zones.

Denmark is divided into urban zones, summer cottage areas and rural zones. Special rules apply to development in rural zones where agriculture is the priority economic activity. Whereas new independent dwellings, urban businesses and institutions require a rural zone permit, new agricultural buildings can be built without a permit. This protects recreational and valuable landscapes, and ensures that agriculture retains good production opportunities.

Special rules for planning are in place for coastal zones. The Danish coasts (including what are now summer cottage areas) have been remarkably protected by a 100-metre protection zone since the 1930s. This Zone is enlarged to 300 metres in open coastal areas. In urban areas, the protection zone, from 0 to 300 metres, has to be designated by a special Coastal Protection Committee. A special three-kilometre coastal area planning zone is determined in the Planning Act. The planning zone requires justification by special planning or functional reasons prior to locating buildings and construction works in coastal areas. The aim is to keep them as free as possible of development and installations that do not need to be located near the coast.

Through the Planning Act the municipalities are obliged to include guidelines in their municipal plans for the management of the nature protection interests, including the geographical positions of nature areas of high conservation value, ecological corridors and potential nature areas and ecological corridors.

Moreover, the municipal plans must also include guidelines for designation of reforestation areas, wetlands and the use of streams.

Under the Planning Act the Danish government has issued 2 orders, which implement the EU Directive on Environmental Impact Assessment and the EU Directive on Strategic Environmental Assessments.

All projects, plans and programmes that may have a significant effect on natural and environmental values of national interest are therefore subject to such assessments. Effects foreseen in such assessments must be mitigated to the extent it is described in Danish law. This includes rules for dispensation under certain circumstances.

## **Municipal cooperation**

### **Count down 2010 declaration**

On the 25.th of January 2008, the region of Southern Denmark and 16 municipalities in the South of Denmark, signed, as the first municipalities in Denmark, the Countdown 2010-declaration on biodiversity. This means that the region and the municipalities have committed themselves to support the target of halting the loss of biodiversity before 2010.

Region South Denmark has been chosen to be one among 5 European model regions, which are to promote the biodiversity.

Some of the municipalities have so far worked out detailed plans for how the count down 2010 target will be achieved at ground level.

### **Nordic municipal cooperation**

The municipalities of Hedensted, Herning, Holstebro og Kolding are involved in a Nordic co-operation, which exchanges experiences and carry out concrete biodiversity projects. The outcome of the cooperation will be reported before 2010. The project is financed by the Nordic Council of Ministers and consists of 13 municipalities in total.

## **Agriculture, forestry, fishery and aquaculture policies**

### **Agriculture**

In 2008 about 63,4% of the total area of Denmark (i.e 27330 km<sup>2</sup>) is used for agriculture. The percentage seems to be decreasing slightly. The primary agricultural sector produced 1.5% of GDP in 2005, and has been on a steady decline since the 1960's. In the 1990's it represented 4.5% of GDP. The adoption of intensive farming increased the average size of holdings from 16 ha in 1965 to about 55 ha in 2005, while the number of holdings decreased from about 200.000 to 46.2700 during the same period.

It also increased the number of livestock (less cattle but more pigs), though the number of livestock units has been almost the same through all the years.

Several Danish policies aim to reduce the environmental impact of agriculture by promoting organic farming, re-establishment of wetlands, environmentally sound farming practices, the controlled use of genetically modified organisms, and the reduced use of pesticides and nutrients. For instance, farmers are encouraged to take wetlands out of agricultural production and re-establish them. Farmers are compensated for the loss of farmland value or offered a corresponding area of farmland elsewhere.

Under the Rural Districts programme it is possible for landowners to achieve payment for certain activities aimed at improving the environment. One of these activities is management of grasslands and nature areas. The figures for the period 2006-2009 are:

- 2006: Contracts on 58.729 ha for periods between 5,10 and 20 years.
- 2007: Contracts on 100.400 ha for periods between 5,10 and 20 years.
- 2008: Contracts on 92.500 ha for periods between 5,10 and 20 years.
- 2009: Contracts on 85.000 ha for periods between 5,10 and 20 years is expected. The precise figures are not known yet.

The Danish agreement on Green Growth contains a set of initiatives aimed at the promotion of a market-based organic sector:

- Frameworks for a market-based development of the organic sector will be developed so that in 2020 the organic sector will have more than doubled compared to the 2007 level. The organic sector is thus expected to comprise 15% in 2020 compared to 6% in 2007.
- Funds to the area-based grants will be increased so that they can support an annual growth in the organic sector up to 18,000 ha. Initiatives to promote sales of organic foods, etc. must be strengthened, cf. Annex 2.
- A number of simplifications were introduced at the last revision of the Ecology Act in 2008. Nevertheless, there is a continued need for simplification of the regulations governing the organic sector. Therefore a diversely composed committee will be appointed that is to investigate the possibilities for further simplification and ease of administration within the organic sector. The Parties will discuss the committee's report on simplifications, which will be available at the beginning of 2010.
- The registration fee for the organic logo for large scale kitchens will be withdrawn in order to promote use of organic raw materials in the catering industry.

- A special starter pool will be established for organic biogas totalling DKK 15 million from 2010 to 2012, cf. item 2.3.
- The initiative will be evaluated in 2013 to assess whether there is a need for additional measures.

## **Forestry**

Denmark is pursuing a policy of doubling the national forest cover in 80-100 years. For the time being, the forest cover increases at a pace of around 2000 ha/year, which is about half of what is needed to achieve the target. A new subsidy scheme which has just been put in place will make it economically more attractive for private landowners to plant new forest. The priority areas for afforestation are those where groundwater needs to be protected as a source of drinking water.

In general the forest management has started to shift towards sustainable management, which is a challenge considering that many forests are very homogenous and look like plantations. An important objective of the National Forest Programme (2002) is to promote a conversion to "close to nature forestry". An action plan for the introduction of close to nature forestry in the state forests (2005) identifies the use of native or other well-adapted tree species, the retention of permanent forest cover by avoiding large clear-cuttings, the use of natural regeneration, development of diverse forest structures, and single tree management as the key principles for the close to nature policy. The exploitation of all state forests (25% of Danish Forest) is now environmentally certified according to national FSC and PEFC standards. This confirms the trend towards emphasising non-timber and environmental values.

## **Fisheries**

The activities of fishing fleet in Denmark account for 0,13 % of the Gross Domestic Product, whereas the entire fisheries sector including aquaculture, fish processing and the wholesale branch accounts for 0,4 %. The number of commercially active vessels in the Danish fleet fell substantially in the period 2005-2007. This is also the case for employment as well as for the total value of landings.

The Common Fisheries Policy in the European Union aims at a progressive implementation of an ecosystem-based approach to fisheries management, which contributes to efficient fishing activities within an economically viable and competitive fisheries industry, while minimising the impact of fishing on marine ecosystems.

The national legislation aims at utilising fishing opportunities while ensuring that Danish quotas are not exceeded. The Fisheries Act covers the protection of fish stocks, regulations on commercial and recreational fisheries, first hand sales and duties. The recreational fishery is regulated by means of restrictions on the amount and kind of gear used. National measures include the release of fish and research by the fees charged for fishing permits.

The Common Fisheries Policy in the European Union shall apply the precautionary approach in taking measures designed to protect and conserve living aquatic resources, to provide for their sustainable exploitation and to minimise the impact of fishing activities on marine ecosystems. The process to designate additional Natura 2000 sites in Danish marine waters has begun. Some existing marine Natura 2000 sites will be extended and new areas will be designated, especially in the North Sea. When the sites are designated and approved, Natura 2000 management plans will be drawn up and the fisheries in these areas will be regulated as appropriate.

## **Aquaculture**

The regulation on the European Fisheries Fund which was adopted in 2006 will allow numerous possibilities to provide financial support to sustainable development of aquaculture during the period 2007-2013. Council Directive 2006/88/EC on animal health requirements for aquaculture animals provides a new and improved legal framework to address health issues in aquaculture. Regulation No 708/2007 concerns the use of alien and locally absent species in aquaculture, and Regulation No 834/2007 concerns the organic production and labelling of organic product, including organic production in aquaculture.

The demand for more effective technologies to reduce pollutants in effluents and more effective use of extracted water has led to a shift from many small farms to fewer but larger operations. Fish farms are required to obtain water extraction permission and an environmental approval. Fish Farm owners must send the government information about the type and amount of feed and drugs used and the results of the freshwater fish farm's self regulation. Denmark must also perform an environmental assessment of the fish farms in accordance with the EU Habitats and Birds Directive and the Ramsar Convention.

A large number of complaints are registered against fish farms because of concern about their impacts on the local water environment due to the presence of nutrients from leftover food and antibiotics. Nonetheless, waste feed and discharges of phosphorus and nitrogen were halved for fish production between 1989 and 2006 (NERI 2004).

The Danish agreement on Green Growth contains a set of initiatives within aquaculture. A grant pool totalling DKK 100 million will be established from 2010 to 2015 as a supplement to the existing support options in the Fisheries Funds. The pool is dedicated to the most advanced recirculating technologies (FREA - full recirculated aquaculture facilities or model fish farms type 3) and can operate with a higher funding percentage (40%), due to the greater environmental advantages and investment uncertainty associated with this type of facility.

An aquaculture committee will be appointed with the remit to investigate the aquaculture industry's long-term business and environmental conditions.

## **Extraction of raw materials**

Extraction of raw materials in Denmark is regulated through the Raw Materials Act.

At sea extraction can only take place within certain geographically limited areas. These areas have to be biologically assessed before extraction can take place. It is obligatory to make an EIA before extraction can take place in Natura 2000 areas and Ramsar sites. Extraction can only take place if the EIA shows that the extraction will not make it harder to achieve a favourable conservation status for the species and nature types for which the areas have been designated. Outside marine Natura 2000 areas, EIAs are not obligatory. Whether an EIA will have to be conducted, depends on the amount of extraction, more than 1 million m<sup>3</sup> per year or a total of 5 million m<sup>3</sup> for the whole license result in an EIA. Also the outcome of a screening for possible significant environmental effects may result in an EIA or a change in the geographically limits of the area. Raw materials which are being extracted are sand and gravel. Around 8 million cubic metres are being extracted each year from the sea. Extraction of larger boulders has not taken place since 2002 and it is envisaged to ban extraction of boulders from the marine environment, within the coming years.

On land, the Regional authorities are responsible for making plans for the extraction of raw materials and for defining geographically limited areas in which extraction of raw materials can take place. These plans must be subject to an SEA.

On land the Municipalities are obliged to include considerations for nature protection, when they give permissions for the actual extraction of raw materials. If the extraction takes place in Natura 2000 areas and Ramsar sites, extraction can only take place if the activity doesn't make it harder to achieve a favourable conservation status for the species and nature types for which the areas have been designated.

The authorities must also make sure that no breeding and resting places for animals listed under the habitats directive's annex IV are destroyed and that the listed species are not disturbed. Furthermore the authorities are obliged to make an environmental rehabilitation plan for the areas where extraction has taken place.

## **Infrastructural development**

### **Railways**

Recently, the Danish Government launched a major plan for infrastructure development. The plan makes the following statements in relation with integration of biodiversity into the transport sector:

The Government will structure the planning process of new, major infrastructure projects in such a way that a preliminary assessment uncovers the traffic effects, economic effects, and impact on nature and environment. This will establish the foundation for the overall assessment of whether to proceed with the projects. If it is decided to proceed with a project, the thorough environmental assessment (EIA) will determine how the project will be carried out- amongst others how to mitigate effects on the environment.

Regarding projects within the existing infrastructure impacts on nature will be reduced if possible. The impacts of existing infrastructure will be reduced by establishing wildlife corridors, bridge paths, wildlife fences, warning signs and reduced speed on locations with large numbers of wildlife.

With regard to the integration of biodiversity into planning of new railways, the main process is the application of environmental impact assessments on projects (EIA's). Further, the European Natura 2000 directives have played a role of integrating biodiversity into railway planning procedures.

As to integration of biodiversity into rail infrastructure management, rail Net Denmark provides the following information:

Rail Net Denmark is removing trees along the railway up to 6 meters from the tracks to allow the engine drivers to see the surroundings and the signals along the tracks.

A positive side effect is that removing trees allows smaller bushes with flowers and berries to sprout up. These open and brighter areas with wild bushes and flowers attract insects, birds and smaller wild animals and also function as habitats and corridors for wildlife along the tracks.

Rail Net Denmark is also controlling invasive plants like giant hogweed, which is spreading and choking other plants along the tracks.

### **Highways**

The Danish Road Directorate (DRD) has the overall responsibility for the planning, construction, operation and maintenance of state roads in Denmark. Local authorities however have the responsibility for roads owned by the municipalities.

As a general rule, the aim of the DRD and the Danish Ministry of Transport is that the mobility and energy consumption in Denmark is sustainable regarding environment and nature.

When DRD is planning a new state road or an extension of an existing state road biodiversity (species protected by the Habitats and Bird Protecting Directives, red listed species, species protected by Danish law, but also species not protected by international or national law having problems with fragmentation) is assessed. This especially applies to roads where an EIA is carried out. Actions to minimize impacts of the road on biodiversity (fauna tunnels etc) are integrated in the project.

Concerning roads in rural areas DRD is obliged to ask the Ministry of Environment for permission to carry out the project (due to the Nature Protection Law) before the beginning of the construction work. Protecting biodiversity is part of the permission.

*Success stories:*

In Denmark there is an increasing awareness of the importance of monitoring, knowledge and EIA-methods.

### Monitoring

In 2007 the DRD financed an investigation and follow-up assessment by the National Environmental Research Institute on placement and effect of fauna passages at the motorways in Northern Jutland (<http://www.dmu.dk/Pub/FR631.pdf>).

In 2005-2008 the DRD financed a Ph.D study on the pollutant transport from highway surfaces caused by rain and the ability of drainage ponds to hold back matter that may contaminate the environment (surface water).

In 2009 the DRD will initiate a monitoring program for five newly build wildlife passages.

### EIA-methods

In 2008 DRD and the Ministry of Environment in cooperation initiated a project developing a biological model to calculate biological connectivity of moor frog (*Rana arvalis*) in order to qualify EIAs. The project is supposed to continue for another 3 years. The model will be designed to handle other species than moor frog and other amphibians also.

In 2009 the DRD will initiate a study developing a method to assess impacts on bats.

### Knowledge

In 2008 DRD financed a study on great crested newt colonization of human made ponds and ponds adapted by humans.

In 2009 DRD finishes a study on points of conflict between state roads and important nature areas / green corridors. Actions to minimize the conflict and enhance the mobility of animals have been assessed for all points of conflict. Carrying out the proposed improvements will minimize the barrier effect of the state roads. Currently many state roads cross green corridors but do not allow animals to cross the road safe (because of a lack of fauna passages, embankments along streams etc). When extending existing roads conditions are changed to the better.

In 2008 DRD took the initiative to start the project group Wildlife and Traffic within Conference of European Directors of Roads. One of the goals of this project group is to exchange knowledge. Time schedule is 2009-2011.

### Guideline

The DRD in cooperation with national authorities and NGOs have made a guideline on fencing along state roads. One of the goals of the new strategy for fencing is to minimize the barrier effect of roads.

The DRD aims to revise the Danish guideline Fauna and Human Passages in near future.

Actions that need to be taken to enhance implementation of biodiversity:

In order to enhance the integration of biological diversity in planning, construction and operation of state roads in Denmark a great interaction between the action taken on the state roads (eg. fauna passages) and other physical planning of the landscape by local authorities is preferred (e.g. range of rural and urban areas). This interaction helps to protect green corridors crossing state roads.

## Financing and expenditure

Financing for nature and biodiversity protection in Denmark consists of both direct in-kind funding. The main sources of direct funding are public funding (state, counties until end of 2006, municipalities, EU and private funding). The Nature Conservation Act provides funds for acquisition of property to implement major nature restoration projects and state afforestation

projects. The act also provides loans or subsidies to municipalities (and provided them to counties until the end of 2006), as well as to organisations and private landowners who wish to tend and restore natural areas and improve the opportunities for recreational activities. In-kind or voluntary funding is generally through management or monitoring activities by the public.

Total government expenditure on nature conservation including county and municipality expenditures was DDK 2528 million in 2005, up from DDK 2118 million in 2000. Total figures after 2005 are not available. However the Counties were closed down by the end of 2006 and an unspecified part of the resources they used on nature protection went to the municipalities and to the state.

While overall public funding has increased for nature protection, contributions from the national government dropped from DDK 1 012 million in 2000 to DDK 968 million in 2005. In the last ten years, public funds were distributed roughly into 40% for nature conservation, 40% for afforestation and 20% for recreational activities (Enemark 2002). The number of personnel involved in nature conservation and protection was reduced by 20% (from 1271 in 2002 to 1024 in 2006).

	2000	2003	2005
Total national government expenditure	1012	912	968
County expenditure	809	975	1101
Expenditure by municipalities	297	353	458
Total	2118	2240	2528

Management of state-owned areas included.

Source: MoE, National Forest and Nature Agency

**Table 9:** *Public expenditure for nature protection 2000 – 2005 (DDK million).*

Since 1999 Denmark has benefited from EU funding for many projects associated with nature and biodiversity. The EU Common Agricultural Policy (CAP) programmes, and especially the Rural Development Programme, exert a very strong influence on nature by promoting multifunctional agriculture including agri-environmental incentives etc.

Additional, the EU LIFE programme has contributed significant funds for nature conservation projects. In view of the importance of the forest for producing ecological services like the regeneration of ground water government funding of DDK 6,5 million is made available annually for private landowners for consultation purposes and developing plantations. The low rate of reforestation leads one to believe that the incentive programmes could not compete with the return on investments from competing sectors, such as agriculture or industrial livestock production.

No data are available on private funding for nature conservation or protection in Denmark. However three organisations are major actors in nature protection through land purchase and management: the Danish Bird Protection Foundation (with more than 850 ha in 18 bird sanctuaries),

The Aage V. Jensen's Foundation (several properties in the country) and the Nordea Foundation (through sponsoring private and state projects). Several other large private foundations exist and contribute to Danish nature conservation and research.

## **Fiscal policy**

In recent years the Danish Government has worked to integrate biodiversity conservation and sustainable use into a number of major fiscal policy decisions, including most recently in the decisions on investment in infrastructure and on tax reform.

In January 2009 the Government thus decided on a 12-year financial framework for public expenditure in the transport sector until the year 2020. The agreement also lays down the principles for the specific allocation of the financial framework. It is stated as one of the principles that bridges, roads, and railways cannot be allowed to destroy irreplaceable nature.

Furthermore the Government reached an agreement with the Danish Peoples party on a reform of the tax system in March 2009. One feature of the reform is an increase in a range of environmental taxes, including increases in several taxes which are expected to have a beneficial effect on biodiversity conservation. For example, it was decided to raise the rates for the emission of nitrogen, phosphorus and organic material under the waste-water tax. In addition it was decided to raise the taxes for a number of green house gases. In total the reform is expected to raise the level of green taxes by approximately 1.1 billion Euros, including revenue from CO<sub>2</sub> quota auctions.

There have also been taken steps to integrate biodiversity conservation and sustainable use into the advice the Government receives on its economic policies. The Environmental Economic Council was thus established by law in 2007. The council has 24 members representing unions, employers, NGOs and the Danish Government and is presided over by four independent university professors. The chairmanship prepares reports for the council which contains analyses on different environmental issues with relevance to the Danish or Global economy.

## **Education**

### **Nature schools and eco bases**

Nature schools and eco bases are facilities placed in nature areas where environmental education can take place. In many instances, the facilities have a specific person in charge of the teaching and the activities on the spot.

The idea is to teach the pupils in all subjects on the spot and to integrate environment and nature considerations in all the subjects.

The nature schools and eco bases are often established in a cooperation between the municipalities and the ministry of environment and serve schools, kindergartens, clubs etc.

The state is involved in 11 eco bases, and 35 nature schools through out the country. Many more exists though and are run solely by the municipalities.

### **Nature Guides**

In 2006, over 950.000 people participated in more than 36.000 events, led by 310 nature guides. New figures for 2007 and 2008 are not available at the moment, but it is expected that participation has been at an equal or greater level in the years following 2006.

See more (in Danish):

<http://naturvejledernet.skovognatur.dk/Naturvejlederordningen/Beretning/aarsrapport2006.htm>

### **Education material**

The ministry of environment has published a wide range of educational materials for schools. A few initiatives will be high lighted here.

A series of education materials are available under the title, "follow the fox". The material is differentiated to suite the needs of both younger and older pupils and teachers. The ministry of

environment is also in a process developing educational material to new subjects as national parks; which is a new concept in Denmark

Every year, a Forest Day is held, with events about forestry and forest biodiversity scattered all over the country. In relation to the Forest Day, a school book about an aspect of forest biodiversity is published and made available to schools. The books are focus on information for pupils in 1. to 3. grade.

See more (in Danish):

[http://www.skovognatur.dk/Ud/Undervisning/Materialer/foelg\\_raeven/Materialer.htm](http://www.skovognatur.dk/Ud/Undervisning/Materialer/foelg_raeven/Materialer.htm)

See more (in Danish):

<http://www.skovognatur.dk/Ud/Undervisning/Materialer/Emma/EmmaOgRaeven.htm>

The Danish ministries of Environment and education have made a 3-year partnership agreement with the Danish Outdoor Council, about promoting an education programme, called Green Flag – green School. The agreement implies that Denmark will be spending DDK 6,6 mio. targeted on education in 500 Danish schools on nature, environment and sustainability. The schools will have to be sustainable and the pupils will be taught about sustainability. The Green Flag School started in 1994 and is part of an international network of so called Eco-Schools, which encompasses millions of pupil in around 28.000 schools in 46 countries from China, Japan, Africa, Europe and USA.

See more (in Danish): [www.groentflag.dk](http://www.groentflag.dk)

Biology is taught in elementary school, high school and university. The general state and the trend of development of the knowledge about nature in the Danish population is not known. However there is no reason to believe that it should be increasing.

## **International co-operation**

### **International agreements**

By 2009, Denmark has ratified almost all international conventions concerning nature and biodiversity, including the Convention on biological Diversity with all three elements (i.e. genes, species and ecosystems) and the protocols on genetically modified organisms and access and benefit sharing.

Denmark has worked towards the objective of halting the loss of biodiversity by 2010 in accordance with the targets set at the Gothenburg EU summit in 2001 and the World Summit on Sustainable Development in Johannesburg In 2002. Denmark is a signatory of the Ramsar, the Washington and the Bonn Conventions, which are implemented through various government programmes.

Denmark is also a party to all the regional agreements that are important to it, including: the Wadden Sea Seal Agreement, the African-Eurasian Waterbirds Agreement, the Agreement on the Conservation of European Bats, and the Agreement of the Conservation of Small Cetaceans of the Baltic and North Sea. Denmark has also signed the UNECE forest initiatives as well as the regional conventions (e.g. Oslo, Helsinki and the Bern and landscape Conventions of the Council of Europe.

In 2004 Denmark ratified the Convention on the Law of the Sea and the Agreement related to implementation of its part XI. Denmark has not ratified the International Convention for the Control and Management of Ship's Ballast water and sediments, but expects to do so in 2011.

## Multilateral assistance

Denmark's international development assistance supports projects that encourage the conservation of nature and biodiversity and are consistent with the Convention on Biological Diversity objectives of substantially reducing the loss of biodiversity by 2010. It has identified priority issues to advance biodiversity and nature conservation: sustainable forest management and combating illegal logging; mutually supportive efforts to combat climate change and preserve biodiversity; integration of biodiversity considerations in climate change mitigation and adaptation; establishment of a global network of protected areas on land and at sea; combating and preventing the introduction of invasive alien species; development of an international regime on access and benefit sharing.

In 2005, Danish development assistance totalled DDK 12.6 billion corresponding to 0.81% of GNI. Denmark continues to be among the major contributors of development assistance and has undertaken to grant 0.8% of GNI in development assistance over the coming years.

	2001	2002	2003	2004	2005
Bilateral Aid	745	470	438	1.112	935
Multilateral Aid	1.332	1.418	1.241	1.255	1.260
Total	2.077	1.888	1.679	2.367	2.195

**Table 10:** Danish ODA contributions to implementation of the CBD over the period 2001-2005 (DDK mill.). Source: Danida's annual reports 2001-2005

Denmark's multilateral environmental assistance supports efforts made by a number of international fora to promote sustainable development.

Two international events in particular established the agenda for the multilateral cooperation on environment and sustainable development: the Rio conference in 1992 and the Johannesburg summit in 2002.

Continuous efforts to implement and further develop the results from these meetings are, at the international level, primarily made by the EU, UN fora, international organisations and at meetings at conventions and protocols. Denmark participates actively in the global dialogue in these for a. Denmark financially supports developing countries' participation in this process and assists them to implement and comply with the decisions made. The main focus is on central issues covered by international conventions and partnerships such as water, water resources, energy, protection of biodiversity, climate, chemicals and sustainable land management. Important multilateral partners in environmental assistance over the last decades include GEF, UNEP, IUCN and IIED. Added to these is cooperation with particularly the World Bank, the regional development banks and UNDP concerning integration of environment into the organisations' overall work as well as support to specific activities in the environmental field.

GEF is one of the most important global tools for financing global environmental protection. GEF is financed through assessed contributions. GEF furthermore manages a number of voluntary funds to which Denmark contributes. In total Denmark has provided more than USD 150 million to the GEF since 1991.

The cooperation with UNEP focuses in particular on the organisations' efforts to develop and strengthen global environmental agreements, strengthen the national environmental instruments and develop policies and strategies. Denmark is working to make UNEP's efforts focused and efficient – for example by enhancing the developing countries' capacities to both contribute to, and make use of, global environmental agreements. UNEP is financed through voluntary contributions. The Danish support involves an annual, general contribution supplemented by earmarked funding.

The support to IUCN and IIED is aimed amongst others at securing their participation in the international dialogue on policies for nature conservation, poverty/environment and trade/environment. Another priority is helping the organisations to focus their work and to

integrate it further into the other efforts for environmental development at country level. Table 11 presents the CBD relevant multilateral assistance for 2005 based on total Danish contributions to those multilateral institutions/programmes whose institutional objectives support the CBD.

Institution / programme	2005
Global Environmental Facility	65,2
World Bank	503,4
African Development Bank	179,0
Asian Development Bank	57,8
Inter-American Development Bank	10,0
UNDP/specific programmes	370,0
UNEP	31,0
UNEP/centre for Water and Environment	4,0
IUCN	20,0
IIED	5,0
IWGIA International Work Group for Indigenous Affairs	14,9
Source: Danidas Annual reports 2001-2005	

**Table 11:** *CBD-relevant support to Multilateral Institutions in 2005 (DDK mill.).*

### **Bilateral assistance**

Denmark's bilateral development assistance currently focuses on 15 developing countries (programme countries) based on long term national strategies on poverty reduction. Sub-Saharan Africa remains the major recipient of Danish bilateral aid. In 2001 bilateral assistance totalled DDK 6,409 million, equivalent to 47,1% of total Danish ODA, while the bilateral aid for 2005 amounted to DDK 7,230 million, or 57,2% of total Danish ODA.

Bilateral assistance is usually concentrated on between two or four sectors in each programme country. Sector programme support makes it possible to focus resources, work and long term initiatives and, in cooperation with the recipient country (including government authorities and civil society), build up knowledge and skills in order to ensure better sustainability of the results.

One key bilateral activity in support of the CBD is the environmental support given to countries in Asia, Africa and Latin America. In Asia, the Danish support programme includes Bhutan, Cambodia, Indonesia, Malaysia, Nepal, Thailand and Vietnam. In Africa, the following countries receive environmental support: Egypt, Kenya, Mozambique, South Africa, Tanzania, Zambia and the South African Region. In Latin America, There are environmental support programmes in Bolivia and Nicaragua, in addition to a Central American Regional environmental support programme. Furthermore, as environment is mainstreamed in Danish development assistance, it remains an important element in a number of other programmes, including sector programmes on agriculture, water and sanitation etc. The Danish bilateral assistance to programme countries is in response to the recipient countries' own priorities and is based on individual country strategies that describe the framework for cooperation, including objectives, targets and priorities for each country. In general, these country strategies include priorities that are in line with the CBD.

### **Support to key commitments in the CBD**

The CBD includes a number of shared commitments for maintaining the worlds' biological diversity. Articles 6-20 of the CBD specify the key obligations of each contracting party. An overview of how Denmark has supported developing countries' efforts to fulfil some of those obligations is given in table 11 below, which links the key commitments in the CBD to CBD to

Danish development assistance. All the countries listed have a Danish cooperation agreement in which one or more components support a specific CBD commitment.

CBD articles	Key Commitments	Examples of Danish Environmental support
6, 10 and 11	Developing national biodiversity strategies, plans or programmes. Establish policies which act as incentives for the conservation and sustainable use of biodiversity.	Bhutan, Bolivia, Cambodia, Indonesia, Kenya, Mozambique, Nicaragua, Malaysia and Laos (support to greening of PRSP and mainstreaming of biodiversity into national policies and plans).
7	Identifying and monitoring biodiversity in accordance with Annex 1 of the CBD including monitoring of: Ecosystems and habitats Species and communities Described genomes and genes	Malaysia (university collaboration, mapping of biodiversity) Nicaragua (protected areas, research agreements, national environmental information system) Vietnam (environmental information system, marine protected areas network)
8	Supporting <i>in situ</i> conservation measures encompassing the: Establishment of protected areas, rehabilitation and restoration of degraded ecosystems and promoting the recovery of threatened species Protection of indigenous peoples and their knowledge systems Mitigation of potentially hazardous exotic species and biotechnology products	Bhutan, Malaysia, Nicaragua, Tanzania, Thailand and Vietnam (PA management). Bolivia (PA establishment, national PA systems, natural resources management in indigenous peoples territories, support to demarcation and collective land rights) Cambodia community based natural resources management, integrated coastal areas management) Central America (local level natural resources management) Mozambique (community based natural resources management)
9	Complementing the protection of natural habitats through ex-situ conservation measures	Regional forest seed sector programmes (Cambodia, Laos, Vietnam) Malaysia (captive breeding) Nicaragua (tree seed centre)
12, 17 and 18	In accordance with the special needs of developing countries, establish programmes for: Scientific and technical education Exchange of information, technical and scientific cooperation to support implementation of the CBD.	Bolivia, Malaysia, South Africa, Tanzania and Thailand (University collaboration on forest management) Central America (research collaboration) Indochina (University collaboration with Cambodia, Laos and Vietnam)
13	Promote and encourage understanding of the importance of, and the measures required for, the conservation of biological diversity, as well as its propagation through media and in educational programmes.	Bolivia, Cambodia, Nicaragua, South Africa, Thailand and Vietnam (environmental education in schools, public awareness)
14	Introduction of Environmental Impact Assessment (EIA)	Bolivia (EIA support as part of decentralised environmental management, SEA on mining sector) Ghana (SEA on water and sanitation) Indochina (EIA and SEA training and capacity

		development in Cambodia, Laos and Vietnam) Mozambique (SEA on coastal zone) Nicaragua (EIA support to environment ministry, support to municipalities, transport sector support)
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**Table 12:** *Key commitments in the CBD linked to Danish development assistance*

*General measures for conservation and sustainable use (CBD article 6)*

The contracting parties are committed to developing national strategies, plans or programmes that reflect the CBD commitments. The conservation and sustainable use of biodiversity must therefore also be included as a cross-cutting issue within the planning process.

Denmark has contributed with analyses of the best ways to include and develop environmental considerations in the PRSP's (greening of PRSP), both as a cross-cutting issue and in the individual sectors. These analyses have also examined how this development can be supported through institutional and organizational capacity building of the authorities in the countries concerned. This process has been supported in Bhutan, Bolivia, Cambodia, Indonesia, Kenya, Mozambique and Nicaragua. Other countries have been supported in the process to develop and implement a national biodiversity strategy, i.e. the Lao PDR National Biodiversity Strategy and Action Plan.

There has also been given support to developing the national framework for biodiversity conservation. In Nicaragua, support included capacity building and a strengthening of the regulatory and policy framework by developing environmental standards and a national environment plan. Malaysia is supported in order to enhance opportunities for introducing biodiversity conservation and management safeguards into sectoral policy, programme and planning processes.

*Identifying and monitoring biodiversity (CBD article 7)*

Identification and monitoring of biodiversity is especially important in terms of supporting the establishment and appropriate management of protected areas. Danish support to the GEF is important in this regard since GEF finances the consolidation of many national protected area systems. Moreover, many GEF financed projects are site-based and include identification and assessment of biodiversity as well as the design and establishment of biodiversity monitoring schemes.

Some environment programmes, supported by Denmark, have also contributed have also contributed to identifying areas containing biodiversity of high conservation importance. This has often happened in collaboration with universities and NGOs, as in the Eastern Arc Mountains of Tanzania where support was provided to identify important areas for biodiversity. The identification of important marine areas has also been supported, as in the Marine Protected Areas Network component in Vietnam, which undertook an inventory and assessment of potential marine protected areas.

The development and establishment of different types of biodiversity monitoring schemes has been supported both inside and outside protected areas. These have ranged from a community-based biodiversity and natural resource use monitoring system in Tanzania to forest cover monitoring using remote sensing and Geographical Information System (GIS) in Nicaragua.

*In-situ conservation (article 8)*

The CBD emphasizes the importance of supporting in-situ conservation. This line of support includes establishing protected areas and developing guidelines in this regard; biodiversity management inside and outside protected areas, including many types of sustainable Natural resource Management; the promotion of broader habitat and ecosystem protection and rehabilitation; sustainable development I buffer zones around protected areas; preventing the spread of genetically modified organisms (GMOs); resolving conflict over use and conservation;

respect for indigenous peoples' territories, culture and intellectual property rights; and legislation on threatened species. The majority of Danish bilateral assistance of relevance to the CBD is, in some way, supporting in-situ conservation. The following is a selection of Danish supported activities in this area:

### Protected areas establishment and management

Danish support to activities that explicitly promote the objectives of the CBD are often related to the identification, establishment, monitoring and management of protected areas. Among the examples are Nicaragua, where continued support is being provided to the National Protected areas system and to the largest protected area in the country: the Bosawas Biosphere Reserve and the Indio-Maíz Biological Reserve.

In Tanzania, support has been provided for the establishment and management of the 3.250,00 ha Malagarasi-Muyovozi wetland as a Ramsar site. In Vietnam, the focus has been on both terrestrial (Pu Houg PA and U Minh Thuong PA) and marine protected areas (Hon Mun Marine Protected Area, Con Dao and Cu Lao Cham). Together with the Ministry of Agriculture and Rural Development, World Wildlife Fund (WWF)-Denmark and WWF Indochina have developed a long-term management strategy for the terrestrial PA system.

Protected areas management has been supported in both peninsular Malaysia (Krau Wildlife Reserve, Endau Rompin National Park) and Sabah (conservation area along the Kinabatangan River). In Bhutan there was support to the management of the Bumdeling Wildlife Sanctuary. Co-management of PAs is supported in several places.

### Invasive species

The introduction of non-native, harmful invasive species can cause severe damage to native biodiversity. Support has been provided – among other examples – to the International Water Hyacinth Programme and its work in Africa to develop an environmentally friendly fungal pesticide that will help bring the water hyacinth under control.

### Indigenous peoples

To conserve biodiversity it is vital to work with indigenous cultures and the traditional knowledge they possess. Many of the world's biodiversity hotspots and high biodiversity wilderness areas are inhabited by indigenous peoples, and their territories cover a large amount of biologically important land areas in many regions of the world.

A long term support to indigenous peoples organizations and territories in Bolivia has succeeded in demarcation and titling of numerous territories. Technical assistance is provided to sustainable natural resources management including conservation of biodiversity.

In Nicaragua, support has been provided for more than a decade to indigenous communities in the Bosawas Biosphere Reserve to protect their territory and promote a sustainable use of natural resources.

Denmark has furthermore supported two phases of the Consolidation of the Amazon Region (COAMA) programme in the Colombian Amazon. The programme supports the training and capacity building of indigenous organizations with the aim of ensuring their ability to develop their own policies and fulfil the legal and technical- administrative requirements for management of their territories.

The International Work group for Indigenous affairs (IWGIA) is supported through a multi-annual framework agreement. The organization supports indigenous peoples in Latin America, Africa and Asia in their political struggle for recognition and their rights of self-determination. The work of IWGIA includes intellectual property rights, natural resources management, and the conservation and sustainable use of biodiversity.

### **Ex-situ conservation (CBD article 9)**

Ex-situ conservation, whereby plants, animals or genetic material are removed from their original habitat and conserved in special facilities, is in most cases a last resort and the most resource intensive solution for the conservation of critically endangered biodiversity. Examples of ex-situ conservation activities supported by Denmark include support to forest tree seed banks (south

eastern Asia and Nicaragua) and to a gaur breeding facility in Malaysia (component of the Krau National Park Project).

### **Sustainable use of natural resources (CBD Article 10)**

According to the CBD conservation and sustainable use of biological resources is to be integrated into national decision-making. Traditional cultural practices related to the use of biodiversity is encouraged and protected. Support should be given to local activities improving degraded areas. Governmental and private sectors are encouraged to collaborate on developing methods for sustainable use of biological resources.

Sustainable use of natural resources is vital to long-term improvement of living conditions for disadvantaged population groups and to assure the basis of future production. Sustainable management of biological diversity is vital for securing food supplies as well as for preserving unspoiled habitats, health, the environment and a stable climate.

Among the natural resources, the forests and the wetlands play a crucial role. While representing in themselves a multifunctional ecosystem characteristic of rural countryside, they

not only make a vital contribution to the preservation of the climate, to the protection of the protection against natural hazards, to tourism etc, but also – in their function as elements of the rural production system – play a huge role in the reduction of poverty.

Sustainable natural resources management is a main priority in Denmark's development cooperation. Activities include the integrated water resources management, integrated coastal zone management, sustainable land management and protection and sustainable use of wetlands and forests.

Sustainable water resources management is supported through global, regional and country programmes (see Box 2).

Sustainable forestry is supported in several countries among those Cambodia, Honduras, Nepal, Nicaragua and Thailand. Support includes community forestry and certification. In Tanzania, Denmark has through more than 10 projects provides a substantial support to establishment and consolidation of participatory forest management.

### **Research and training**

Scientific and technical education and training programmes for the identification, conservation and sustainable use of biological diversity are much needed in developing countries. Likewise with research that contributes to conservation and sustainable use. An example of Danish support in this area is the development of an environmental education and research programme at Can Tho University in Vietnam. The objective of this project is to assist the University to develop its capacity to provide environmentally oriented teaching and research to serve the special needs of the Mekong Delta Provinces for natural resources management. Activities like these will often also contribute to the obligations under CBD articles

#### **Box 2: Danish Support to water resources management**

Global water initiatives

The EU water Initiative (EUWI)

Global Water Partnership

The UNEP Collaboration Center on Water and Environment

The UNEP IWRM programme

World Water Assessment Programme

Regional Initiatives

African Water Facility

Rural Water Supply and Sanitation Initiative (RWSSI)

Integrated Water Resources Management in the Southern Africa Development Community (SADC)

Integrated Water Resources Management of the Economic Community of West African States (ECOWAS)

The Nile Basin Initiative (NBI)

Mekong River Commission

Zambezi River Authority

Country Initiatives

Bangladesh, Benin, Bhutan, Burkina Faso, Ghana,

16-18 “Access and transfer of technology”, “Exchange of information” and “ Technical and scientific cooperation”.

The major modalities of research and training in relation to the CBD are ENRECA<sup>40</sup>, the Danish Council for Development Assistance, research centers and support to research through the environment programmes. One example is an on-going long-term ENRECA programme between Danish Universities and Uganda and Tanzania, which seeks to strengthen local capacity in biodiversity research.

Another long-term collaboration on biodiversity research took place in the period 1999-2003 between the University of Sabah (UMS), Malaysia and Danish universities. Denmark has supported the Asian Institute of Technology (AIT) since 1994. This programme includes research and training in areas such as integrated watershed management and integrated pest management. University collaboration between South Africa and Denmark on sustainable NRM and PFM in Southern Africa took place over the period 2000-2005.

Denmark is host to the global Biodiversity Information Facility (GBIF) and a major donor to the institution. The main task for this centre of knowledge is to register all available biodiversity information in the world. The knowledge is made available to all participating parties.

### **Education and Awareness (Article 13)**

General environmental awareness and understanding of the importance of biodiversity for human well-being is important, as is a general understanding and appreciation of principles on sustainable use. The CBD recommends to the parties to support activities promoting environmental education in schools and general public awareness raising.

Denmark has supported many initiatives in the field of environmental education and awareness raising. Two examples can be highlighted:

Support has been provided for a decade to the Danish NGO Nepenthes, who in partnership with the Nicaraguan Fundacion del Rio develops environmental education for children and young people in the buffer zone of the Indi-Maiz Biological Reserve. Activities include curriculum development, education materials, a nature centre, natural trails, a radio station, agroecological training and school gardens.

The Outdoor Council, a Danish Umbrella organisation for 93 associations related to outdoor life, nature and the environment, is involved in an environmental education programme in Kenya alongside Kenyan Organisation for Environmental Education. The project aims to implement the green School concept in 300 schools and to strengthen environmental education in another 1200.

### **Impact Assessment (CBD Article 14)**

Any proposed projects that are likely to have significant adverse effects on biological diversity should undergo an environmental impact assessment with a view to minimising or avoiding such effects. Denmark is supporting developing countries to ensure that Environmental Impact Assessments (EIA) become a natural part of planning and that capacity is built in terms of implementing EIAs.

The environmental support provided by Denmark includes capacity building in EIA methodologies. One example of this practice is the long-term development of Ministerio del Ambiente y los Recursos Naturales Nicaragua (MARENA), Nicaragua. Another example is the regional collaboration on environmental planning and management, the USEPAM programme. This programme has organised a number of EIA courses for local university staff and government officials in Cambodia, Laos and Vietnam.

Strategic Environmental Assessments (SEAs) have been supported in Bolivia (mining sector), Ghana (SEA on Water sanitation), Mozambique (SEA on coastal zone), and Vietnam (SEA on Fisheries sector).

Denmark is also providing training and capacity building in EIA in other types of support such as the transportation sector programmes in Bangladesh, Benin, Ghana, Nicaragua, Tanzania, Uganda and Zambia.

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<sup>40</sup> Programme for Enhancement of Research Capacity in developing Countries

### **Access to genetic resources (CBD article 15)**

Access to genetic resources and equitable benefit sharing are one of the three objectives of CBD. Since the Earth Summit in Rio de Janeiro in 1992 the Parties of the convention have been committed to facilitate access to genetic resources and of sharing benefits arising from their use. In 2002 at the World Summit of Sustainable Development in Johannesburg the governments decided on a mandate to elaborate an international regime on access and benefit sharing of genetic resources. The deadline of the negotiations is CBD COP 10 in 2010. In 2009 at CBD COP 9 in Bonn the Parties decided on a roadmap for the remaining period of the negotiations. This mandate will structure the upcoming negotiations in 2009-2010. This next phase of the negotiations is critical since the actual substance of the regime is to be negotiated. Denmark participates actively in these negotiations – both on EU and international level and supports the development of an international regime on access and benefit sharing.

## Chapter IV - Conclusions: Progress towards the 2010 Target and Implementation of the Strategic Plan

The status of biodiversity in Denmark reflects the country's high population density and a long history of intensive commercial exploitation of raw materials, soils, timber, water and stocks of wild species. The vast majority of the country is covered by highly modified urban, silvicultural and arable areas, where construction, cultivation and plantations limit biological diversity. However, there are some natural areas left with high biological diversity. The long protected coastal line, the extensive sea territory and more recent regulations to protect birds and mammals from unsustainable hunting has helped to protect large areas of important habitats and their biological diversity, including large populations of birds.

From a biodiversity perspective, forests hold the largest number of Danish species and also the largest number of threatened species. Forests cover 12% of the Danish terrestrial land area, the vast majority of which is intensively managed logged plantations with relatively few old growth habitats and forest glades for endangered species<sup>41</sup>.

However in the last 20 years some efforts have been made to secure such habitats, through a Danish national strategy for natural forests, through certification and through a shift towards close to nature forestry practices of all the Danish state forests. Moreover, many of these positive effects on threatened species will only manifest themselves fully after a long period of time, as forest ecosystems react slowly to changes.

The coastal and marine ecosystems must be considered the most important Danish contribution to European biodiversity, as Denmark holds a major proportion of the areas of dunes, saltmarsh and shallow marine waters, of crucial importance for specialised lichens, plants, fungi and invertebrates, as well as waterbirds, of which Denmark hosts a large globally important share of many flyway populations, e.g. East-Atlantic population of light-bellied brent goose (100%), Svalbard population of pink-footed goose (100%) and the Baltic-Wadden Sea population of common eider (86%)<sup>42</sup>.

In conclusion, the best current scientific estimate is that biodiversity is still declining. It should be stressed that it is a challenging task to reverse population declines that follow decades of declining habitat area and quality. First, there is a marked delay in the population response to habitat destruction for most species, especially perennial and sedentary species which may survive long after de facto habitat destruction. When habitats are restored or conditions improved, the recovery delay may be even longer, especially for species with poor dispersal ability and highly fragmented populations<sup>43</sup>.

The main threats to Danish biodiversity are identified to be: Cultivation, pesticides, eutrophication, land drainage, overgrowing, land drainage, high-intensity logging in forests and plantations, former activities to straighten and dam watercourses and commercial fishing.

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<sup>41</sup> Normander, B., Henriksen, C.I., Jensen, T.S. Sandersen, H., Henrichs, T., Larsen, L.E. & Pedersen, A.B. (red.) 2009: Natur og Miljø 2009 – Del B: Fakta. Danmarks Miljøundersøgelser, Aarhus Universitet. 170 s. Faglig rapport fra DMU nr. 751, [http://www.dmu.dk/Pub/FR751\\_B.pdf](http://www.dmu.dk/Pub/FR751_B.pdf)

<sup>42</sup> Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet:

<sup>43</sup> Ejrnæs, R. 2009: Notat til By og Landskabsstyrelsen med udkast til kapitel 1 til 4. landerapporten til CBD-sekretariatet om tilstand, udvikling og trusler for Danmarks biodiversitet:

In the coming years more national parks will be established, depending on local consent. Moreover 75.000 ha of new nature areas are planned. The negative effect of pesticides and eutrophication will be reduced, and more species action plans are envisaged to be carried out. More over the Danish government have made a Green Growth agreement in the Danish Parliament in 2009. A total of DKK 13.5 billion is to be invested in Green Growth until 2015, which is about a 50% increase in investments compared to previous initiatives.

## **Appendix 1: Information concerning reporting party and preparation of the national report**

The Danish report was prepared by a team of desk officers for biodiversity at the Agency Spatial and Environmental Planning, the Danish Forest and Nature Agency under the Ministry of Environment.

The preparation included 2 phases of stakeholder involvement:

Contributions were solicited to specific parts of the report from inside the Agency Spatial and Environmental Planning and the Ministry of Environment as well as from other ministries and organizations notably the National Environmental Research Institute under The University of Århus.

The draft report was commented upon by the initial providers as well as by a broader group of stakeholders through a national hearing. No meetings were held.

The Kingdom of Denmark consists of three parts: Denmark, Greenland and the Faroe Islands with extensive autonomy, also on matters of environment and thus on biodiversity. Therefore three individual reports have been prepared to CBD.

The Kingdom has a common foreign policy, which encompasses several environment and biodiversity matters. Implementation falls separately in the three parts, but close collaboration exists on many issues. Several institutions concern matters from all three parts. This report concerns Denmark.

Denmark is a member of the European Union. For biodiversity this means that all EU directives and regulations, the Biodiversity strategy and its four action plans (Nature Protection and natural resources, Agriculture, Fisheries, Development) are integrated in various ways into the national policies and programmes, including in sectors such as nature protection, forestry, fisheries, hunting and agriculture. For some areas such as protection of sites and areas there are two layers of protection: the wide national site protections and general nature type protection, on top of which is built the EU Habitats and Birds Directive protection.

Similarly for species and habitat types.

Biodiversity is increasingly integrated into the general goals of new or renewed national acts and guidelines. However, problems exist in implementation and distribution and passing-on of knowledge and skills as well as with insecure stability in financing and subsidies.

Denmark participates in the European Community biodiversity work programmes in several fora (Malahide process, European Commission groups (Biodiversity Expert Group BEG, WPIEI, European Clearing House Mechanism as development leader) as well as in the forestry, agricultural and fishery groups.

At the pan-European level Denmark participates via the Bern and Aarhus Conventions, the MCPFE process (Ministerial Process for Protection of Forest in Europe) and the EEA anchored SEBI2010 process on streamlining biodiversity indicators and the similar MCPFE indicator process. Denmark is a member of the European Environment Agency (EEA).

Denmark has ratified both the Bonn, CITES and Ramsar Conventions as well as several conventions and agreements for the seas and oceans and their biodiversity. Danish Development Aid programmes have covered a wide variety of issues, including to a limited extent also biodiversity, though mostly indirectly.

Danish NGOs are well organised and active.

Education on biodiversity has no separate high priority in Danish schools, but is given higher priority as an integral part of the increased focus and priority on education in natural sciences. However, the public interest in nature through nature interpreters is very high. The scientific education at universities is generally high. The term biodiversity as used by the Convention is not well understood, and the public understanding of the basic importance of biodiversity from a holistic socio-economic and protection perspective is still limited.

# Forth National Report on the implementation of the Convention of Biological Diversity of Greenland

Government of Greenland  
The Ministry of Domestic Affairs,  
Nature and Environment  
Nuuk, Greenland



## Executive Summary

The Kingdom of Denmark is the signatory part to the Convention of Biological Diversity. The Danish Kingdom consists of Denmark and the self-governing areas of Greenland and the Faeroe Islands. The Government of Greenland has the overall management responsibility over several sectors including the right of self-determination over biodiversity and living resources while aspects such as foreign affairs, defence, and the judicial system are however shared with Denmark. The ruling authority in Greenland is the Government with its parliament. The National Day 21th. of June 2009, Greenland had self-governance.

In line with the Convention, Greenland has in the recent years paid attention to different actions to secure the implementation of the Convention.

In 1999, a comprehensive country report was compiled of Greenland's ecosystem by the Greenland Institute of Natural Resources, "The Biodiversity of Greenland – a country study". This document has been updated and translated into English (Jensen & Christensen 2003).

In 2003 a new Nature Protection Act (Landstings Act no 29 of 18 December 2003 on the Protection of Nature) was adopted. The Act implements a number of obligations that can be derived from the Biodiversity Convention. The overall objective of the law is to conserve biological diversity, including genes, habitats, species and ecosystems and to ensure sustainable exploitation of natural resources. The main objective is to support the Government of Greenland on its implementation of the Biodiversity Convention and other closely related international agreements and to conserve the biodiversity in Greenland.

Climate changes with its impacts on Arctic biodiversity are of great concern even if it is not the only stressor. Others include; environmental contaminants, invasive species, increased shipping and air traffic, and regional development such as oil and gas exploration and production.

Consequences of climate change includes more open coastal waters and following increased human activities such as increasing tourism and mineral exploitation, which all may contribute to increased threats towards biodiversity, habitats, and ecosystems. Monitoring and adaptive management responses are therefore of prime importance for future management systems.

Some of the Greenlandic species did show a decline during the last decades among others due to unsustainable hunting, which has been explained as one of the major threats. However during the last years efforts has been given to secure sustainable hunting by following the scientific biological recommendation on the game species with a successful increase in some populations. The harvest of many marine mammal species are regulated in executive orders and follow biological harvest advice on sustainable off-take. There is, however, a need to constantly monitor harvests of non-regulated species to assess whether regulation is needed.

The development of management plans for protected areas and local awareness are given very high priority in Greenland. Identifying conservation interests and ensure relevant protection of areas important for biodiversity are needed. Greenland has initiated a project that will identify national conservation priorities, develop a national strategy for monitoring protected areas, develop management plans for specific areas, focus on information dissemination initiatives, etc.

The major obstacles to encountered the implementation of the Convention are due to lack of resources / and manpower. This is of major concern in relation to implementation of international agreements, development and implementation of comprehensive monitoring programmes for protected areas and resources etc.

## Chapter 1 – Overview of Biodiversity Status, Trends and Threats.

Greenland is situated in the arctic region. The total area of the island is 2.166.086 km<sup>2</sup> making it the world's largest. The central part of the island is ice-covered (85 %), and only around 410.449 km<sup>2</sup> is ice-free during summer. Climate spans from low (sub) arctic in the south to high arctic in the north affecting distribution patterns of flora and fauna. Distribution patterns are however also influenced by altitude as well as inland versus coastal regions.

Greenland was totally covered by ice during the last glacial period (until ca 8.000 years ago) and all flora and fauna has invaded Greenland in this period. Atlantic and Arctic waters surround the island of Greenland creating barriers to terrestrial wildlife and plants. During winter much of Greenlandic sea freezes, with the exception of south western Greenland where coastal areas are kept open by the golf current. The closest landmass is Ellesmere, Canada, which is separated from Northwest Greenland by the 26 km narrow Nares Strait. The 240 km wide Denmark Strait separates Greenland from Iceland.

### Ecosystems and habitat diversity

On the following pages a short presentation of the Greenlandic habitats will be given with a presentation of status, trend and threats.

#### Terrestrial ecosystems

Greenland has the northernmost and the longest north-south stretch of landmass in the Arctic and the range from north to south is more than 2,600 km. Combined with rugged coastline, mountainous terrain, arctic deserts, inland areas, this results in a wide range of variation in physical conditions and therefore, a diversity of living conditions for terrestrial organisms. The geology is rich and complicated in some areas, simpler in others, and supports remains of some of the earliest life on earth more than 4 billion years old. An important feature is that 85 % of the terrestrial country is covered by the Greenland Ice Cap and only 15 % is ice free. The landscape was formed and continues to be formed, by the effects of the ice on its surface and glaciers. Permafrost occurs throughout Greenland in continuous, discontinuous and sporadic patterns.

Primary production and decomposition of dead organic matter is low and slow in Greenland in comparison to more temperate and tropical regions. Nutrient levels in ground layers, and thereby a plant's growing conditions, varies with terrain and the history of the landscape. Areas where the inland ice has recently exposed the ground are barren with only few pioneer species. However, the inner fjords in south Greenland are fertile and scrub and woodland growth can be found here.

The mentioned physical conditions shape species composition and distribution of plant communities and habitats. The diversity of terrestrial habitats can be illustrated by describing the plant communities. Below is a short description of the overall various terrestrial plant communities taken from Jensen & Christensen (2003), where more details about sub-communities and references can be found.

Table 1: Terrestrial habitat types - Inspired by Jensen & Christensen (2003)

Habitat type	Description	Status and trends – potential threats
Heath:	Vegetation dominated by dwarf shrubs, i.e woody plants less than half a meter tall. Heath is the most common vegetation type, especially in Low arctic Greenland. In the southern part of Greenland northern willow <i>salix glauca</i> and bog bilberry <i>Vaccinium uliginosum</i> ssp. <i>microphyllum</i> are widespread. Crowberry <i>Empetrum</i> dominates the coastal areas, while dwarf birch <i>Betula nana</i> and rock cranberry <i>Vaccinium vitis-idaea</i> ssp. <i>minus</i> assume the dominant role in the warmer arid inland. In the Middle arctic part, white Arctic bell-heather <i>Cassiope tetragona</i> is completely dominant in places with a protective snow cover every winter. Tundra willow <i>salix arctica</i> is present in nearly all plant communities in the High Arctic.	Favourable. No overall threats.

<b>Scrub:</b>	Meter-high scrub of northern willow <i>Salix glauca</i> is found in the Low arctic along streams and protected slopes with heavy snow cover during the winter. Inland, in southwest Greenland, green <i>alder</i> <i>Alnus crispa</i> makes up the scrub.	Favourable. No overall threats.
<b>Forest:</b>	Together with scrub, forest belongs to the most productive terrestrial habitats. Birch forest is only found in the summer-warm inland areas in South Greenland. These areas contain several boreal species not found elsewhere in Greenland. Trees of mountain birch <i>Betula pubescens</i> can reach heights of up to 7 meters. Closely associated with mountain birch are several fungi. Qinnua Valley in South Greenland has the most developed subarctic birch forest.	Favourable. Potential threat due to sheep grazing in South Greenland.
<b>Snow-bed</b>	The snow-bed plant community is located on sites that covered by snow large parts of the year due to wind, shadow or other physical parameters. The species here are adapted to the short growing season and favour the stable winter temperatures and humidity	Favourable. No overall threats.
<b>Herb-slope</b>	Like snow-beds this habitat has a thick and stable snow cover during the winter. In contrast to snow-beds however, the growing season is only shortened by a small amount since herb-slopes primarily occur on south facing slopes with a high amount of solar radiation and thus an early snow melt. Characteristic to this community type are several species of fern and two of Greenland's orchid species. Northern willow <i>salix glauca</i> is the only woody plant that grows on herb-slopes.	Favourable. Potential future threat in South Greenland since many herb slopes here are located close to the sparse agricultural places.
<b>Grassland and steppe</b>	Dry grass and sedge dominated habitats occur in central West and East Greenland. They are associated with south facing slopes and flat valley bottoms with a thin snow cover.	Favourable. No potential threats.
<b>Mires</b>	Mires predominantly occur in the southern and northern part of Greenland. They are dominated by sedge or grass plant communities. Tundra sedge <i>Carex stans</i> dominates the Greenlandic High Arctic mires, while loose-flower alpine sedge <i>Carex rariflora</i> and russet sedge <i>Carex saxatilis</i> dominate the Low Arctic regions.	Favourable. No potential threats

## Freshwater ecosystems

Most of Greenland's fresh water is bound in the 1,700,000 km<sup>2</sup> inland ice, which amounts to about 9% of all fresh water on Earth. A large amount of fresh water is released every spring as melt water from the Ice Cap and from snow. Surface drainage is poor due to the permafrost layer and rocky underground. Hence most of the rain that falls in terrestrial habitats (not as snow on the inland ice) feed water runoffs and plays a role in building and eroding the landscape.

Most Greenlandic freshwater areas are nutrient poor since they only receive a minimum of nutrients from the clean melt water.

As one moves north, a general adaptation among Arctic insects is an increasing degree of dependence upon water and moist surroundings.

The melting of glaciers and of the Ice Cap itself and summer rainfall leads to the countryside crisscrossed by an abundance of melt water streams. Below is a short description of the various Greenlandic freshwater habitats. The text below is taken from Jensen & Christensen (2003), where more details and references can be found.

Table 2: Overall freshwater habitat types according to Jensen & Christensen (2003)

Habitat type	Description	Status and trend – potential threats
Streams	Created by meltwater from glaciers. They transport a lot of sediment and are very cold. Only a few algae are present and the vegetation along streams is generally lush and consists of mosses and attached algae, which can be found as thin layers on the rocks. There are usually no aquatic plants. As in all of	Favourable. No overall threats.

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	Greenland's fresh water, midge larvae, an important food source for Arctic char, are present. Arctic char, Atlantic salmon and three-spined sticklebacks can be found.	
Brooks	Often cut through the landscape in the same place from year to year and on their way, create substrates for mats of vegetation. They are shallow and usually dry out in the summer. They can have rich bottom vegetation consisting of aquatic plants, mosses and algae.	Favourable. No overall threats.
Outflow from lakes	Is often clear and has a slower water flow than streams (Røen, 1981). The temperature of the outflow depends on the temperature of the associated lake. Outflows are usually more nutrient rich than the lake itself and support well-developed vegetation, consisting primarily of algae and mosses. In comparison to the other types of fresh water, they also contain a rich midge and entomostracan fauna.	Favorable. No overall threats.
Homeothermic Springs	Are unique areas with a special diversity compared to the other freshwater areas. The warm water affects the local climate and results in the occurrence of specific species in and around the springs. It also results in an accelerated growth rate of plants and animals in the area. Most of Greenland's homeothermic springs are found on Qeqertarsuaq and along the Blossville Coast in East Greenland. There are thousands of homeothermic springs on Qeqertarsuaq, most of which have a temperature between 0 and 3°C. Most of the springs that are known from the east coast are 38-62°C. There are three homeothermic springs with a temperature of 40-42°C on the island of Uunartoq in South Greenland.	Favourable. Human activities can on few location be a threat
Nutrient poor lakes	The most <i>nutrient poor lakes</i> are found in areas from which the ice has withdrawn recently and the vegetation cover, and hence the addition of organic matter, is still sparse. Characteristic plants include the spiny spore quillwort <i>Isoetes echinospora</i> , which becomes less common as the amounts of nutrients and ions decrease, burreed <i>Sparganium hyperboreum</i> and alternate flowered milfoil <i>Myriophyllum alterniflorum</i> . The bottom is covered in moss <i>Drepanocladus exannulatus</i> and the characteristic algae are of the genera <i>Oedogonium</i> and <i>Microspora</i> , which are filamentous green algae, and <i>Lynghya</i> (blue-green algae)	Favourable. No overall threats.
Nutrient rich lakes and ponds	Are found in areas with runoff from loose soil, raised marine deposits, moraine particles and calcium containing substrates. Nutrient-rich lakes and ponds are particularly vegetation-rich and have the richest fauna, composed of several groups of crustaceans (Crustacea), aquatic beetles (Coleoptera) and insect larvae.	Favourable. No overall threats.
Saline lakes	<i>Saline lakes</i> are found in some areas with low precipitation, for example, at the base of the fjords by the fjord Kangerlussuaq, Uummannaq Fjord and Independence Fjord. The lakes receive meltwater that contains salts released during cliff erosion and the concentration of calcium, sodium and magnesium salts is increased when water evaporates from the surface of the lakes. The lakes have a skewed distribution of phosphate and nitrogen and only a few plants can live under these conditions.	Favourable. Like homeothermic springs they have a unique flora and fauna and a few are very close to developed areas and attention is necessary.

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## Coastal Ecosystems

Greenland's coast has a countless number of large and small islands and fjords resulting in a coastline of about 40,000 km. It is rocky coastline with numerous islands, deep fjords and large fjord networks.

The coast and some of the fjords are characterized by relatively high primary production. In addition to the spring bloom of phytoplankton, a late summer bloom also occurs. The recycling or transport of nutrients to the top water layers, by ocean currents and tidal water movement, causes this late summer bloom. Because of the high primary production, life along and near the coast is rich in comparison to the rest of the marine

environments. The coastal areas support several important habitats including nesting sites, moulting areas and feeding areas for a variety of birds. There are *haul-out sites* for harbour seals and walrus on the coast and marine environments near the coast function as *spawning* and *maturity grounds* for fish, including capelin and lumpfish *Cyclopterus lumpus*. Arctic char *Salvelinus alpinus* stay close to the coast during their migration. This productivity provides feeding grounds for a number of marine mammals, including polar bears, narwhals, beluga, seals, etc.

## **Marine Ecosystems**

Greenland is surrounded by several bodies of water and these are affected by the different currents that adjoin Greenland. The transportation of water with different salinities and temperatures by ocean currents, and the dispersion of ice and marine organisms are of fundamental importance to the distribution and composition of marine ecosystems. The relationship between the cold East Greenland Current and the warmer, more saline Irminger current varies from year to year and affects the distribution of marine species. It also affects which species of fish and marine mammals that are able to enter Greenlandic waters. The currents result in upwellings of nutrient-rich water, which provide the basis for a high level of primary production. The currents are also important in the transportation and distribution of sea ice.

Thus marine ecosystems in Greenland are characterized by seasonal ice cover and marked fluctuations in temperature and light. In regions with seasonal ice cover, the ice and ice melt have a significant influence on ecological conditions. When the ice melts, there is typically a sudden increase in light and a burst of plant growth in the form of an ice edge bloom in spring and summer. These support large populations of fish, marine mammals and birds.

The waters surrounding Greenland can be divided into several regions that vary in primary production levels. Production can be high throughout the summer, with limited production in darker, colder winter months. In Greenland, organisms that are pelagic throughout their life dominate the zooplankton. The most important being crustaceans, pteropods, jellyfish, ctenophores and arrow worms.

Crustaceans, especially species of the genus *Calanus* and krill (Euphausiacea), are important in the marine ecosystem. Fish, fish larvae, birds and marine mammals all feed on crustaceans. Among the pelagic fishes, polar cod *Boreogadus saida* and capelin *Mallotus villosus* play the most important role in the ecosystem as prey for several predators.

Most of Greenland's birds are bound to the sea and live primarily on a diet of crustaceans and small fish like the capelin. Blue whales *Balaenoptera musculus* and bowhead whales *Balaena mysticetus* feed exclusively on crustaceans and other planktonic organisms, while the other great whales, to greater or lesser degrees, supplement their diet with fish. Among the toothed whales, killer whales *Orcinus orca* and sperm whales *Physeter catodon* are able to take the largest prey, while narwhal and beluga prey on Greenland halibut and invertebrates. Walrus have a narrow food niche and mainly eat benthic bivalves, which they take from banks. Other seals primarily prey on fish. Polar bears *Ursus maritimus* primarily feed on ringed seals *Phoca hispida* and bearded seals *Erignathus barbatus*, but will also hunt harp seals *Pagophilus groenlandicus* on pack ice.

## **Threats to ecosystems and habitats**

### *Climate Changes*

Climate changes with its impacts on biodiversity are of great concern even if it is not the only stressor in the Arctic. Others include; environmental contaminants, to some extent habitat fragmentation, invasive species, increased shipping and air traffic, and regional development such as oil and gas exploration and production.

The Arctic Climate Impact Assessment (2004) forecasts increases in average temperatures by 2°C in the low arctic areas of South Greenland over the next century, while, the average winter temperature is likely to increase by 6 - 10°C in north Greenland, but dramatic changes in the average summer temperature are not expected. According to the ACIA report Greenland will see an increase in rain- and snowfall by 10 to 50 per cent.

The potential earlier melting of the snow, higher temperatures and along with an increase in rainfall the lengthened growing season is likely to lead to an increase in plant cover. Immigration of species from the south can be envisaged, but would be impeded by barriers in the form of open seawater and competition from already established species.

There is a risk that most of the high-Arctic zone will disappear together with the unique fauna and flora that are adapted to precisely this zone. In north-east Greenland, large areas are completely without vegetation. There are few species of Arctic flora and fauna, and those present have adapted to the extreme climate conditions. Many plants and mammals depend on a stable snow cover to protect them against the cold. Other species are dependent on the snow disappearing early - or being blown away altogether in winter. The distribution, duration, and thickness of the snow cover are therefore just as important factors as the temperature for the general conditions of life for many plants and animals in Greenland. In high-Arctic Greenland, more ample precipitation would presumably mean more extensive plant cover, and large parts of this zone would possibly change character to become more like low-Arctic areas.

However, the effects of climate change also bring new opportunities to the Greenlandic society. Retreating ice is exposing ancient bedrock enriched with minerals, including diamonds, olivine and zinc, and Greenland is experiencing an increase in mineral exploration activities. The economy largely depends on fisheries and tourism, but new industries are developing with the mineral activities and the plans for an aluminium smelter on the island of Maniitsoq. In South Greenland agriculture is developing as more vegetables can be grown and in the future small scale forestry might develop and current livestock of sheep might be supplemented by cattle.

The Greenlandic marine ecosystems are, as part of the Arctic Oceans, subjected to the threats mentioned in the Arctic Climate Impact Assessment for the region. The consequences can be comprehensive for the biodiversity, as well as for the people depending on the ocean for their living. Changes in stocks call for a re-orientation of the industry as northern shrimp *Pandalus borealis* has started to disappear from the waters off South Greenland, while large stocks of Atlantic cod *Gadus morhua* are reappearing.

Except for climate change effects on habitats, almost no habitats are threatened by habitat deterioration. Main part of the ice-free area of Greenland (99,8 %) is undisturbed by human activities, without modern infrastructure and devoid of human activity apart from an impact from traditional hunting and fishery. These activities do not influence habitats, but do have some impact on some exploited species (see species chapter). The following negative impacts on terrestrial and aquatic ecosystems and habitats – commonly found in other areas of the world can not be found in Greenland or only to a very limited extent:

- *Fragmentation*, there is no roads between towns and settlements.
- *Drainage*, only very small areas in the sheep farming districts.
- *Dams*, only in relation to two smaller rivers in relation to water power stations.
- *Transmission lines*, in total only 55 km can be found.
- *Forestry*. Almost no forest areas can be found in Greenland.
- *Agricultural production*. Very little land is used for agricultural purposes.
- *Freshwater pollution*. Only very limited impact in sheep holder districts.
- *Aquaculture* does not exist.

### *Tourism*

Tourism has increased rapidly in the last 20 years and though localised disturbance has been recorded no habitats are threatened. In the World Heritage Site – Ilulissat Ice Fjord a management plan is developed – among others to make attention to threats from tourism (f. ex. erosion, disturbance of wildlife, removal of cultural artefacts).

### *Waste water and garbage*

In relation to threats to coastal ecosystems some minor effects has been recorded locally. For instance there are no waste water treatment plants in Greenland today. Waste water produced both on land and at sea is disposed off into the ocean. Most households have drains that connect with public sewers, but there are still households with no access to sewerage. These houses often have an open waste pipe allowing spill water to run into the terrain, while toilet water is collected and disposed off into the ocean. Industrial waste water from the small scale industry is also disposed off into the ocean.

### *Fishing*

Further various studies have been completed on the effect of scallop scraping on the sea floor. Fishing with scallop scrapers can cause large-scale unevenness on the sea floor, lift large pebbles from the sediment and presumably damage the epifauna. Intensive scallop fishing during strong tidal currents leads to an upwhirling of sediment. This can have a negative impact on scallops as well as other sedentary shellfish since large amounts of clay or mud (particulate inorganic matter) can clog their gills and prevent the absorption of food and oxygen. The scallop fishery has possibly contributed to the decline in the number of moulting king eiders locally some places in Greenland.

### *Emissions*

Regarding the Greenlandic Marine ecosystems and habitats a wide range of activities may influence. Since Greenland lies far from the core industrialized world, one would not expect that environmental problems is serious. However the presence of heavy metals such as cadmium and mercury and chlorinated organic compounds are found in high concentrations in the tissue of arctic organisms. Many studies show that the Greenlandic marine ecosystems are affected by human made pollution. Studies under the Arctic Monitoring and Assessment Programme (AMAP) of the Arctic Council prove that levels of certain heavy metals and POPs are relatively high in a number of marine mammals living in Greenland waters, i.e. ringed seal *Phoca hispida*, harp seal *Pagophilus groenlandicus*, minke whale *Balaenoptera acutorostrata*, beluga whale *Delphinapterus leucas* and narwhale *Monodon monoceros*. The National Environmental Research Institute and the Greenland Institute of Natural Resources (GINR) study the polar bears and have drawn special attention to the health of the East Greenland population, as the animals here have high levels of POPs. Attention is further drawn to activities within the fisheries and hunting, mineral resources activities, the transportation of goods and passengers at sea, cruise tourism and finally non-commercial activities with an influence on the marine environment.

### *Mineral and hydrocarbon exploitation*

Greenland has no exploitation of hydrocarbon resources today, but exploration is taking place in 13 offshore licence areas, including areas in the Greenland parts of the Davis Strait and in the southeast Baffin Bay, west of Nuuk, south and west of Cape Farwell . Besides the exploration of hydrocarbon also prospecting for hydrocarbon has increased over the past years. In Greenland there is broad political consensus that measures should be taken to develop the mineral resource sector into one of the mainstays of the economy.

Also a number of non-commercial activities may influence the marine environment. Some of these activities are of small scale and do not impact the marine environment, while other activities may influence marine environment and biodiversity and may call for measures of protection.

## Species diversity

A nationwide study of the Biodiversity of Greenland (Jensen & Christensen 2003) showed that about 9,400 species are present in Greenland. This number only includes the species that have been recorded and the actual number of species occurring in Greenland is probably higher. It is not possible here to go into details on the status of all species or groups of species and only a rough overview is given below. For a more detailed description of the species and ecosystem types – see Jensen & Christensen 2003 and references herein.

As with other landmasses in the Northern Hemisphere, species diversity decreases from south to north in Greenland. In addition to the gradient in species diversity from north to south, for some terrestrial groups the number of species decreases from inland to coastal areas and from low to high altitude. Adaptations to cold and drought are the primary factors determining the distribution of terrestrial species. The distribution of marine species is primarily shaped by ocean currents, which influence water temperature, salinity and the distribution of sea ice. The inland ice is home to algae and micro-invertebrates and mammals can occasionally be found in the perimeter.

A limited number of species are endemic to Greenland. Endemic species of algae, vascular plants and a single water mite (Hydracarina) have been recorded. A few bird subspecies breed only in Greenland, but winter elsewhere. The small number of endemic species may be attributable to the fact that almost all species present today had to immigrate to Greenland after the last ice age. The time period over which new species could have evolved in Greenland is probably too small for new species to appear.

In 2007, the first Red List for Greenland was published (Boertmann, 2007). Mammals, birds, freshwater fish, butterflies and orchids were selected to be assessed, as these were the taxa, which had the adequate level of knowledge. In total 115 species/subspecies/populations have been assessed, including 37 mammals, 65 birds, 3 freshwater fish, 5 butterflies and 5 orchids.

Three species/subspecies/discrete populations are categorised as *extinct* (EX) or *regionally extinct* (RE), six as *critically endangered* (CR), three as *endangered* (EN), 12 as *vulnerable* (VU) and 12 as *near threatened* (NT). This red list comprises 34 % of the assessed species/subspecies/discrete populations. Five species of marine mammals are categorised as *data deficient* (DD), and five species of mammals, six birds and one butterfly are categorised as *not applicable* (NA). This leaves 13 mammals, 39 birds, two freshwater fish, four butterflies and four orchids as *least concern* (LC).

The *critically endangered* (CR) species comprise six species/populations of marine mammals: Atlantic walrus, Northwater population *Odobenus rosmarus*, harbour seal *Phoca vitulina*, bowhead whale, Spitsbergen population *Balaena mysticetus*, northern right whale *Eubalaena glacialis*, white whale *Delphinapterus leucas* and narwhal, West Greenland population *Monodon monoceros*. The harbour seal is at its most northern limit, hence in small numbers. Furthermore new research has shown higher numbers of the narwhal population than was previously believed and given advice upon. The populations of the two baleen whales bowhead and northern right, were reduced by commercial hunting in previous centuries, and has recovered only slightly or not since the termination of this hunt. The other critically endangered species are all utilised in Greenland at levels that until recently possibly was not sustainable. However in recent years the utilisation is following recommendations from international conventions and GINR based on sustainable harvest.

The *endangered* (EN) species are made up of one mammal and three birds: Atlantic walrus, West Greenland population, Greenland white-fronted goose *Anser albifrons flavirostris* and common guillemot *Uria aalge*. The walrus is hunted, and the combined catches of Greenland and Canada, which share this population. The white-fronted goose is only hunted to a limited degree in Greenland (more in Iceland), but face the potential threat of competition from a rapidly increasing population of Canada geese *Branta canadensis*. The common guillemot has a restricted and localised breeding distribution in Greenland..

Three mammals are categorised as *vulnerable* (VU): One discrete population of caribou *Rangifer tarandus*, polar bear *Ursus maritimus* and wolf *Canis lupus*. The caribou population is listed as vulnerable due to its high degree of isolation from other populations, the wolf population is very small, and the polar bear is threatened due to a predicted reduction in the distribution and quality of its main habitat, the ice surrounding Greenland. In addition, the combined catches of Canada and Greenland for the shared populations of Baffin Bay and Kane Basin are probably non-sustainable. Eight birds are categorised as *vulnerable* (VU). These include: common eider, West Greenland population *Somateria mollissima* and Brünnich's guillemot *Uria lomvia*, whose populations are depleted and have been harvested until recently below sustainable levels; black-legged kittiwake *Rissa tridactyla*, declining probably due to a combination of harvest and climatic factors; ivory gull *Pagophila eburnea*, which is expected to decline in numbers due to reduction in habitat (ice covered waters) and white-tailed eagle *Haliaeetus albicilla*, Ross's gull *Rhodosthetia rosea* and a black-headed gull *Larus ridibundus* which all have very small populations in Greenland. The spawning population of Atlantic salmon *Salmo salar* is also categorised as *vulnerable* (VU), because there is only one river in Greenland where spawning occurs. Among the orchids the small round-leaved orchid *Amerorchis rotundifolia* is categorised as *vulnerable* (VU) because it is only known from very few sites in Greenland.

*Near threatened* (NT) species/populations comprise three mammals: One local and discrete population of caribou, the northeast Greenland population of walrus and the Baffin Bay/Davis Strait population of bowhead whale. The walrus was highly reduced in numbers by commercial hunt in previous centuries. New research has revealed a much higher number of individuals of this whale than hitherto believed. Eight species of birds are categorised as *near threatened* (NT) because their populations are small: great northern diver *Gavia immer*, harlequin duck *Histrionicus histrionicus*, Atlantic puffin *Fratercula arctica*, European golden plover *Pluvialis apricaria*, Whimbrel *Numenius phaeopus*, light-bellied brent goose, East Atlantic population *Branta bernicla hrota*, gyrfalcon *Falco rusticolus* and Sabine's gull *Larus sabini*. Arctic tern *Sterna paradisaea* is also categorised as near threatened due to a population decline.

## Threats to the Greenlandic species

### *Hunting*

While habitats in Greenland are considered intact, some utilised species has been under pressure from overharvest in recent decades. Out of a population of about 56.000 people, around 2500 Greenlanders are occupational hunters licenced to trap, hunt and fish, and close to 6000 are recreational hunters. Hunting is an important income in economic and socio economic terms. Until recently hunting has been one of the main threat towards Greenland's natural resources given the fact that some populations was utilised on unsustainable levels. A large action radius (larger motors) and improved means of transport have moreover, opened to access to far larger areas than were previous available for hunting. However important steps have been taken to secure sustainable hunting among other based on improved scientific knowledge of many the species.

Commonly caught wildlife species include seals (6 species including walrus), polar bear, whales (minke whale, fin whale, narwhale, beluga, harbour porpoise and others). Among terrestrial mammals reindeer, musk ox, hare and polar fox are frequently caught along with rock ptarmigan.

Greenland has a long tradition for seabird hunting and egg collection dating back hundreds of years. Today seabirds still play a key role in subsistence hunting. Human population growth, better guns and faster boats have increased the harvest efficiency. Exploitation of bird species is limited to around 20 species, where the most important are Brünnich's Guillemot, eider, king eider, little auk, and black-legged kittiwake. Brünnich's Guillemot is the most important species harvested.

### *Climate change*

The projected changes in temperature will affect the biodiversity and nature in Greenland. The expected climate change would reduce the thickness of the ice in the fjords, and extend the ice-free period. As a result, more light would penetrate down in the water column, and this would stimulate biological production. Increased fresh water supply as a consequence of increased precipitation and melting of the ice cap in the inner parts of the fjords would increase the water exchange in the fjords and bring more nutritious water in from the open sea, thus contributing still further to increased primary production. Rising winter temperatures would mean that the ice will not reach the same thickness as today and could therefore break up more easily in spring.

Overall, the walrus would probably benefit from future climate change in high-Arctic Greenland. As the ice edge recedes further north during the summer new areas will be available for sub-arctic and migratory whales. Establishment of new feeding grounds will depend on the density of zooplankton, which is in turn influenced by climate-driven upwelling and sea-currents. Blue, fin, minke and humpback whales have already been observed at very high latitudes in East and West Greenland.

Based on a number of parameters such as population size, migration patterns, feeding habits and sensitivity to changes in the sea ice, the narwhal and the polar bear appear to be the marine mammal species most sensitive to climate change, followed by the hooded seal, the bowhead whale and the white whale. Globally, it is likely that polar bears will be lost from many areas where they are common today, and the remaining populations will become more fragmented and isolated. By the end of the 21<sup>st</sup> century, areas north of the Canadian Archipelago and northernmost Greenland will have the greatest likelihood of sustaining viable, albeit smaller, polar bear populations.

Many of Greenland's fish species are limited in their distribution by the cold seas off Greenland the Greenland coast, for example, cod, Norway haddock, striped catfish, halibut and herring, which have their northern limit here. Therefore, relatively small variations in the temperature of the sea could result in considerable fluctuations in the dispersal of many fish species. The trend in cod fishing largely follows the average sea temperature. In the last 30 years, cod and a number of other boreal fish species have largely disappeared as a consequence of a generally colder climate in south and west Greenland. Today, more cold-adapted populations of prawn, crab, and halibut constitute the main commercial fishing resources in Greenland. A change in sea currents and a rise in temperature as a consequence of the climate changes would probably improve the conditions for cod and some other commercially exploited fish species in these areas. Increased cod stocks, however, would have a negative effect of prawn stocks due to predation.

Other examples on species that will probably be negatively affected by climate change are the northeast population of musk ox *Ovibos moschatus* and caribou *Rangifer tarandus* that might be threatened by the climatic changes, while the population in South Greenland is likely to prosper from a more vigorous vegetation cover.

### *Mineral and hydrocarbon exploitation*

Greenland has no exploitation of hydrocarbon resources today, but exploration is taking place in 13 offshore licence areas, including areas in the Davis Strait, Baffin Bay, west of Nuuk, south and west of Cape Farwell and and licens areas are being developed in Northeast Greenland. Exploration drilling is an extensive activity, which will probably take place during the summer months, using either a drilling ship or a drilling rig. Exploration drilling in the waters off West Greenland is expected to take place in 2010 to 2014.

Almost no wetlands in Greenland are threatened by habitatdeterioration. However with rising mineral exploitation interest this can be expected to be a challenge in the future. According to revised nature protection act protection of coastal lines, lakes, streams and springs are implemented.

Natural dispersion of (wild) alien/invasive species to Greenland have not been identified to cause major problems. To prevent and foresee the problems related to introduction of alien/invasive species in Greenland

relevant legislation is implemented in the nature protection act from 2003. According to this act animals, plants and microorganisms not native to Greenland may not be released or bred in the wild. Based on an assessment of the impacts on nature corresponding the Cabinet might permit such release and breeding. In connection with such permission the Cabinet may lay down conditions for the purpose of protecting nature.

### **Values for society and human well being**

Fishing is the lifeline of Greenland and the primary industry in the country. 90 % of all export is derived from fishery. Main products include prawns, and Greenland halibut. Crab, cod, lump sucker, capelin and other mussel and fish species also have importance.

Locally, hunting is both economically and socially important, but hunting does not contribute extensively to the Greenland national economy. In a report on occupational hunting, the formal and informal value of hunting to the Greenland economy is estimated at € 52.200.000 annually, making up for less than 4 per cent of the Greenland GDP. Traditional hunting is, however, of significant socioeconomic importance and is central to the cultural identity of the people of Greenland and remains an important mean of supplying households with preferred meats. Many occupational hunters supplement their income with seasonal employment in other sectors, f. ex. tourism services, administration, construction or mining, recreational hunting. Hunting is regarded as the traditional way of life, it provide an opportunity for an independent lifestyle, it is a respected occupation, and serves to continue traditions and conserve inherited cultural values.

In Greenland there is broad political consensus to develop the mineral and hydro-carbon sector into one of the mainstays of the economy.

## **Chapter II. Current status of National Biodiversity Strategies and Action Plans (NBSAP)**

In line with the requirements of Article 6 (a) of the Convention, Greenland has in the recent years paid attention to different actions to secure the implementation of the Convention and to the developing of a NBSAP.

In 1999, a comprehensive country report was compiled of Greenland's ecosystem by the Greenland Institute of Natural Resources, "The Biodiversity of Greenland – a country study". This document has been updated and translated into English Jensen & Christensen 2003.

In recent years special attention has been paid to the preparation of a Strategy and Action plan for biodiversity in Greenland. It is expected that this NBSAP will be adopted in 2009. The main objective is to support the Government of Greenland on its implementation of the Biodiversity Convention and other closely related international agreements. The NBSAP does include a number of recommendations and actions divided into two phases; the short term (1-2 years) and the long term (5 years). Each recommendation has been assigned one of three priority categories. This will provide a basis for prioritisation of available funds from the Government and external funding mechanisms.

The Strategy and Action plan is to be used directly by the central administration (The Greenland Government) but can also be used to initiate externally driven projects in relation to improved nature protection in Greenland.

Recommendations and actions concern nature protection, sustainability, monitoring, optimising administration and reporting procedures, information and outreach initiatives, capacity building, etc., which are all related to a number of articles in the Biodiversity Convention. Recommendations and actions are not only directed towards the main administrative body (Ministry of Domestic Affairs, Nature and Environment), but also other Ministries, municipalities, institutions etc. It is the intention to set up a steering committee chaired by the Ministry of Domestic Affairs, Nature and Environment with the aim of securing proper implementation of the Strategy and Action Plan.

### **Funding / resources**

The Greenland Institute of Natural Resources (GINR) carry out research on biodiversity and living resources (utilised resources) and, provide biological advice (including recommended sustainable harvest levels) for the Government of Greenland, municipalities and others. By law, the purpose of the institute is among others to obtain the scientific basis for a sustainable exploitation of the nature resources as well for protecting the environment and biological diversity.

Funding for GINR research and monitoring activities are provided by yearly financial budget from the Government of Greenland supplemented with external funding mechanisms, including the Danish Environmental Support Programme for cooperation for environment in Arctic – DANCEA. DANCEA is an environmental funding mechanism that has now existed in more than 15 years. The funding support short term research and conservation projects related to prevention of pollution, climate research, protection and sustainable use of natural resources, health issues, indigenous peoples etc.

### **Public awareness**

The aims for the GINR include the incorporation of local knowledge in the scientific work and an open dialogue with the Greenlandic community. This is achieved through community meetings, dialogue with relevant organisations and outreach through the media via publications, press releases and a website ([www.natur.gl](http://www.natur.gl)).

The Government of Greenland is periodically focusing on different targeted information initiatives related to nature protection and biodiversity. One example is a two-year campaign on sustainable use issues. This campaign was named Tuluqaq (The Raven). During 2002-2004 the promotion of Biodiversity related issues, with TV programs and radio programmes, broad covering in media and public meetings around Greenland.

An important element of the campaign was furthermore to involve hunters along the coast in the dialogue on and improvement of sustainable use of living resources. As part of the Tuluqaq campaign both folders and posters and a homepage with information on sustainable use of living resources was published, reaching out for both children and the general public.

Another example is the establishment of a system with nature interpreters (Rangers). This system has after a pilot period now started up in six Greenlandic towns. The overall purpose is to communicate the relationship between human, nature and sustainability. The system is targeted to children, but also other groups such as local people are relevant.

Finally the Management of *the Ramsar Site - Kitsissunnguit Islands* must be mentioned. The wetland is now protected by Home Rule executive order. In agreement with the local municipality an external funded implementation project is going on in these years. The project includes among others an information and outreach part, and an information strategy is under development. This strategy is meant to be used as inspiration for other protected areas in Greenland.

## ***Chapter III – Sectoral and Cross-sectoral integration or mainstreaming of biodiversity considerations***

### **Legal and institutional framework**

The Danish nation consists of Denmark and the self-governing areas of Greenland and the Faeroe Islands. The Danish constitution applies to this whole region, but both self-governing areas has the right of self-determination over several sectors, while aspects such as foreign affairs, defence, and the judicial system are however shared with Denmark. The Government of Greenland has the overall management responsibility over several sectors including the right of self-determination over biodiversity and living resources. The ruling authority in Greenland is the Government with its parliament. The National Day the 21. of June 2009, Greenland had self-governance. The self-governance arrangement gives Greenland the opportunity to take over a series of areas of responsibility. Of special interest is the responsibility for mineral resources as the income could provide the basis for real independence in the future. The Self-governance agreement recognizes for the first time the inhabitants of Greenland as an autonomous people in relation to the UN. Some fields of responsibility will however still remain with the Danish Authorities. This includes foreign affairs, security and defence policy

The conservation of nature and biodiversity are shared between the Ministry of Domestic Affairs, Nature and Environment and the Ministry of Fisheries, Hunting and Agriculture within the Government of Greenland. The Ministry of Domestic Affairs, Nature and Environment is responsible for the overall international agreements and conventions regarding biodiversity (excl. IUCN) and overall nature conservation including coordination of the implementation of the Action Plan for Biodiversity as referred to in chapter II. Furthermore, the Ministry is responsible for the conservation of habitats and protected areas including the National Park in North East Greenland, The Ilulissat Icefjord World Heritage Site, The Ramsar sites and all protected areas in Greenland. The Ministry of Fisheries, Hunting and Agriculture, is responsible for the management of mammals, birds, fish and commercially exploited shellfish.

Nature protection is regulated in the Nature Protection Act (Landsting Act no 29 of 18 December 2003 on the Protection of Nature) that was adopted in 2003. The Act implements a number of obligations that can be derived from the Biodiversity Convention. The Act provides the framework for legislation related to nature protection. The overall objective of the law is to conserve biological diversity, including genes, habitats, species and ecosystems and to ensure sustainable exploitation of natural resources. The principle objective is to protect nature in Greenland on an ecologically sustainable basis in accordance with the precautionary principle and with due consideration for human conditions of life and the protection of fauna and flora. The act contains regulation on conservation of mammals, birds and other animals, plants, habitats, and description on how to conserve areas. Other paragraphs concerns protection of objects, protection lines, release, keeping, export, import and trade of species, protection of genetic resources, ownership of genetic resources, regulation of GMO, access to nature, nature restoration, and outdoor advertisement. In addition, the law sets up rules about Environmental Impact Assessments. The law is a framework law and must be followed up by necessary executive orders, management plans, procedures etc.

A series of executive orders protect concrete sites in Greenland is implemented. To support future site based protections a specific strategy for managing future site based preservations is under consideration. In addition a strategy for conserving Ramsar sites is under consideration.

Furthermore hunting is also regulated due to the Home Rule Act no. 12 of 29 October 1999 on hunting with later amendments, and hunting is also affected indirectly by other regulations, i.e. the Greenland Home Rule Act no. 25 of 18 December 2003 on Animal welfare.

Finally, several executive orders deal with protected areas, regulate the protection and hunting of individual species and issues such as hunting permits and reporting of catches.

### *Environmental impact assessments in Greenland*

In connection with new licensing rounds and the opening of frontier areas with technologically challenging conditions the Bureau of Minerals and Petroleum carry out Strategic Environmental Impact Assessments (SEIA). An SEIA provides an overview of the environment in the licence area and adjacent areas, which may potentially be impacted by the hydrocarbon activities, and identifies major potential effects associated with future offshore hydrocarbon activities. Furthermore the SEIA identify gaps in knowledge and data, highlight issues of concern, make recommendations for mitigation and planning and identify general restrictive or mitigation measures, as well as monitoring requirements that must be dealt with by the companies applying for hydrocarbon licences.

An EIA is carried out for all extractive activities on non-living resources and major infrastructure projects. The EIA shall include the full lifecycle of activities: exploration, field development, production transport and decommissioning. The EIA must be updated and further developed when needed, e.g. when moving from the explorations to the production phase, or if there is a change in the plans presented in the EIA. The initial EIA related primarily to exploratory drilling shall focus on this activity, but must include assessment of scenarios of possible activities related to production, transport and decommissioning.

The Bureau of Minerals and Petroleum has developed guidelines for preparing an Environmental Impact Assessment. In developing these guidelines, information on the requirements to EIAs related to hydrocarbon and mineral exploration, development, production, decommissioning and transport in other Arctic countries has been studied. The guidelines are based on the Arctic Offshore Oil & Gas Guidelines issued by the Arctic Council, and on the OSPAR Guidelines for Monitoring the Environmental Impacts of Offshore Oil and Gas Activities.

Likewise EIA guidelines have been prepared for mining companies operating in Greenland. The Nature Protection Act - Landsting Act No. 29 of 18 December 2003 on the Protection of Nature. includes frames for EIA's as anyone planning to carry out large building and construction works or to establish business which may significantly change the character of the landscape or of fjord or sea areas or which may significantly affect nature, including the wild fauna and flora, shall carry out an assessment of the impacts on nature before the implementation of the project. The assessment shall describe the plans for the project and any implications that the project is believed to have on the areas of the fjords and the sea and on nature.

If projects are assumed to cause substantial damage to the landscape or nature, the Cabinet may decide that the project shall not be carried out.

In connection with mineral exploration EIA's must be carried out according to the exploration license terms.

It is considered how legal basis can be created for legislation considering terms and conditions on Strategic Environmental Assessments for mega-projects.

In connection to considerations of plans for an aluminium smelter and two - three hydroelectric plants a Strategic Environmental Assessment has been carried out to secure that aspects of environment and nature was included in the basis for decision regarding the decision of whether an aluminium smelter and hydroelectric plants should be established or not, and if so, where it should be placed.

### ***The Ecosystem approach***

At present, Greenland has not implemented ecosystem-based management. The wildlife management today focuses on harvest management of individual species. This, however, do involve some aspects of ecosystems based management through cross-sector involvement of relevant authorities and stakeholder consultation.

Obtaining biological knowledge on arctic animals distributed over vast areas, such as marine mammals, is generally difficult, expensive and dependent on long-term activities. In addition, extreme weather conditions, remote locations and expensive logistics and transportation may limit the biological knowledge obtained from a particular population. Thus, the combination of lack of data and use of precautionary principle often leads to scientific recommendations that are criticised by the hunters. Hunters have accumulated traditional ecological knowledge for decades and therefore often find it difficult to understand and accept the notion catches being limited due to lack of data. In order to ensure that a solid scientific advice is taken into consideration for a sustainable utilisation of the marine mammals, Greenland is represented in a number of international organizations.

### ***International Conventions and Agreements***

As mentioned above The Kingdom of Denmark has three parts: Denmark, The Faeroe Islands and Greenland. The Danish constitution applies to this whole region, but both self-governing areas has the right of self-determination over several aspects, but aspects such as foreign affairs, defence, and the judicial system are shared with Denmark. As the three parts of the Kingdom have the same foreign policy, international agreements are signed by Denmark, but according to the procedures currently in force, the kingdom sign with reservation for Greenland, unless the Greenland parliament has adopted the agreement. Greenland has adopted CBD and has thereby ratified CBD.

Since 1979 Greenland has had its own Home Rule Government, elected by the Greenland Parliament. This implies that the Greenland Home Rule Government can adopt legislation and administer its own affairs in relation to i.e. implementation of international environmental agreements. Therefore, if Greenland has ratified an international agreement it is Greenlands own responsibility to implement the agreement in own legislation and practises and at the National Day the 21. of June 2009, Greenland had self-governance. The self-governance arrangement gives Greenland the opportunity to take over a series of areas of responsibilities. Of special interest is the responsibility for mineral resources as the income could provide the basis for real independence in the future. The Self-governance agreement recognizes for the first time the inhabitants of Greenland as an autonomous people in relation to the UN. Some fields of responsibility will however still remain with the Danish Authorities. This includes foreign affairs, security and defence policy

Greenland has ratified some of the important international conventions concerning nature and biodiversity, including CBD, CITES and Ramsar-convention and has designated 11 Ramsar sites. Further Greenland is part of UNESCO with a World Heritage Site in West Greenland and a Man and Biosphere site in East Greenland (The worlds largest). Greenland is further an active member state in IUCN.

Greenland is represented in the International Whaling Commission - IWC - via the Kingdom of Denmark.

Greenland is not a signatory of the Bern Convention and the Bonn Convention.

It must further be mentioned that Greenland is represented/member in a number of regional, multi and bi-lateral agreements dealing with nature and biodiversity issues. These include:

The Nordic Council's work on biodiversity

Greenland takes part in the work carried out by the work done on biodiversity within the Nordic Council of Ministers. A on going project "Nordic Nature – trends towards 2010" lead by the Finnish Environment Insititute (SYKE) aim to identify trends and status of biological diversity in the Nordic countries towards 2010. Facts sheets on biodiversity are produced and published in all Nordic languages and in English.

Furthermore Greenland have taken part in the project "Nordic Nature Indicators of Climate Change Effects, NICC" that aimed to identify parameters and indicators to facilitate the monitoring of impacts of climate change on nature.

*The Arctic Council's work on biodiversity*

CAFF - *The Conservation of Arctic Flora and Fauna* – a working group within the Arctic Council, where Greenland is an active member and have from 2006-2009 served as the chair of this working group.

The Arctic Council is an intergovernmental forum for addressing many of the common concerns and challenges faced by the Arctic States; Canada, Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, the Russian Federation, Sweden and the United States.

CAFF can in many ways be regarded as a regional collaboration about implementation of CBD. Greenland regards CAFF and Arctic Council as a unique forum for co-operation between national governments and indigenous peoples on matters such as monitoring the sustainability, the environment, the biodiversity and assessing and preventing pollution in the Arctic, climate change, biodiversity conservation etc. in addition to the living conditions of the Arctic residents. CAFF in particular aims at promoting the conservation of biodiversity and the sustainable use of living resources. Greenland see CAFF as an important collaboration on conservation of many circumpolar species and other natural resources that requires close cooperation within the Arctic and with non-arctic states.

The eight arctic nations and the permanent participants within Arctic Council have agreed to let CAFF produce an *Arctic Biodiversity Assessment* with the purpose to synthesize and assess the status and trends of biological diversity in the Arctic. The work will be used to identify gaps in the data record, identify the main stressors, identify key mechanisms driving change and produce recommendations. Greenland priorities this task very high and choose to address many resources to this assessment. Until now, Greenland has together with Denmark offered a Chief scientist to the assessment and will contribute with national inputs. The kingdom further considers financing a project management role in the assessment, including support to outreach and presentation/side event of a trends report at the CBD COP. The trends report will be prepared as Arctic Councils contribution to the 2010 target. Greenland sees the whole work with the assessment as a direct follow up on the CBD obligations towards the 2010 goals.

*The North Atlantic Marine Mammal Commission (NAMMCO):*

Greenland, together with Norway, Iceland and the Faroe Islands, is a member of NAMMCO. NAMMCO works for regional protection, rational management and research on marine mammals in the North Atlantic. Canada is not a member of NAMMCO and it has therefore been necessary to establish forums for bilateral collaboration on shared populations of marine mammals, i.e. the Joint Committee for Narwhal and Beluga between Canada and Greenland and the working group for joint management of the polar bear.

*The North Atlantic Marine Mammal Commission (NAMMCO):* Greenland, together with Norway, Iceland and the Faroe Islands, is a member of NAMMCO. NAMMCO works for regional protection, rational management and research on marine mammals in the North Atlantic.

*Canada/Greenland Joint Commission on the Conservation and Management of Narwhal and Beluga (JCNB):* Formed by Canada and Greenland. The JCNB provides biological and management advice for shared populations of narwhal (*Monodon monoceros*) and beluga whale (*Delphinapterus leucas*) and other marine mammals in the sea between Greenland and Canada.

*ICES/NAFO working group on harp and hooded seals (WGHARP):* Formed by Canada, Greenland, Norway, Russia and the United States. The WGHARP considers recent research and provides catch advice on the North Atlantic stocks of harp seals and hooded seals.

Finally Greenland takes active part in "Northwest Atlantic Fisheries Organization" (NAFO) International Council for the Exploration of the Sea (ICES) and North East Atlantic Fisheries Commission (NEAFC)

### ***Chapter III – Conclusions.***

In 2003 a new Nature Protection Act (Landstings Act no 29 of 18 December 2003 on the Protection of Nature) was adopted. The Act implements a number of obligations that can be derived from the Biodiversity Convention. The overall objective of the law is to conserve biological diversity, including genes, habitats, species and ecosystems and to ensure sustainable exploitation of natural resources.

In line with the requirements of Article 6 (a) of the Convention, Greenland has in the recent years paid attention to different actions to secure the implementation of the Convention and to the developing of a National Biodiversity Strategy and Action Plan (NBSAP) for Greenland. It is expected that this NBSAP will be adopted in 2009. The main objective is to support the Government of Greenland on its implementation of the Biodiversity Convention and other closely related international agreements. The NBSAP does include a number of recommendations and actions divided into two phases; the short term and the long term. Each recommendation has been assigned one of three priority categories. This will provide a basis for prioritisation of available funds from the Government and external funding mechanisms.

Recommendations and actions concern nature protection, sustainability, monitoring, optimising administration and reporting procedures, information and outreach initiatives, capacity building, etc., which are all related to a number of articles in the Biodiversity Convention. Recommendations and actions are not only directed towards the main administrative body (Ministry of Domestic Affairs, Nature and Environment), but also other Ministries, municipalities, institutions etc. It is the intention to set up a steering committee chaired by the Ministry Domestic Affairs, Nature and Environment) of with the aim of securing proper implementation of the Strategy and Action Plan.

A series of executive orders protect concrete sites in Greenland and new ones are now implemented. To support future site based protections a specific strategy for managing future site based preservations is under consideration. In addition a strategy for conserving Ramsar sites is under consideration.

Furthermore hunting is also regulated due to the Home Rule Act no. 12 of 29 October 1999 on hunting with later amendments, and hunting is also affected indirectly by other regulations, i.e. the Greenland Home Rule Act no. 25 of 18 December 2003 on Animal welfare. During the last years efforts has been given to secure sustainable hunting following the scientific biological recommendation on the game species with a successful increase in some populations.

To conclude:

- Protection of biodiversity: There is a need for identifying conservation interests and ensure relevant protection of areas important for biodiversity. Greenland has initiated a project that will identify national conservation priorities, develop a national strategy for monitoring protected areas, develop management plans for specific area, focus on information dissemination initiatives, etc. Sustainable harvest: The harvest of many marine mammal species are regulated in executive orders and follow biological harvest advice on sustainable off-take. There is, however, a need to constantly monitor harvests of non-regulated species to assess whether regulation is needed.
- Monitoring and adaptation: Natural and human induced climate changes will be a future challenge. Consequences of climate change includes more open coastal waters and following increased human activities such as increasing tourism and mineral exploitation, which all may contribute to increased threats towards biodiversity, habitats, and ecosystems. Monitoring and adaptive management responses are therefore of prime importance for future management systems.
- Management plans and information dissemination: The development of management plans for protected areas and local awareness are given very high priority in Greenland.
- Resources: Lack of resources / and manpower are of major concern in relation to implementation of international agreements, development and implementation of comprehensive monitoring programmes for protected areas and resources etc..

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## Post 2010- challenges and priorities

*The target*

Table xx. Progress towards the goals and objectives of the CBD focal area framework.

CBD Goals	Status 2010
<b>Focal Area: Protect the components of biodiversity</b>	
Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes	Partly
Goal 2. Promote the conservation of species diversity	Partly
Goal 3. Promote the conservation of genetic diversity	Partly
<b>Focal Area: Promote sustainable use</b>	
Goal 4. Promote sustainable use and consumption.	Partly
<b>Focal Area: Address threats to biodiversity</b>	
Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.	No
Goal 6. Control threats from invasive alien species.	No
Goal 7. Address challenges to biodiversity from climate change, and pollution.	Partly
<b>Focal Area: Maintain goods and services from biodiversity to support human well-being</b>	
Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods	Partly
<b>Focal Area: Protect traditional knowledge, innovations and practices</b>	
Goal 9. Maintain socio-cultural diversity of indigenous and local communities	Partly
<b>Focal Area: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources</b>	
Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources	Yes

Focal Area: Ensure provision of adequate resources

Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention

No

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