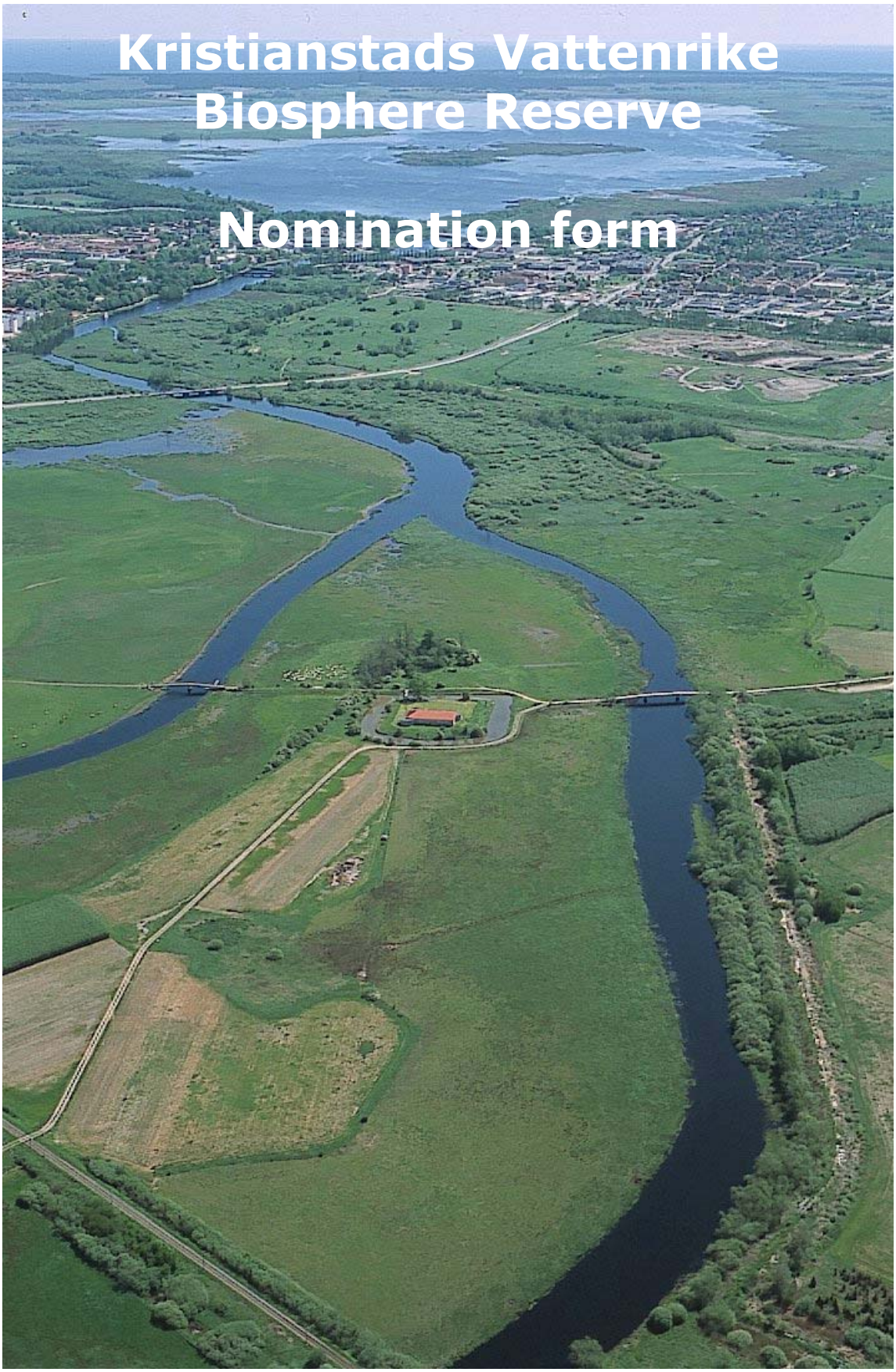
# Kristianstads Vattenrike Biosphere Reserve

# Nomination form



***The documents constituting the nomination form and appendices are also available via the homepage of Kristianstads Vattenrike: www.vattenriket.kristianstad.se***
***Click on the button Projects/Biosphere Reserve.***
The black-and-white maps in this printed version of the documentation are reproduced in colour on the homepage.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***Cover photo:*** The towncenter of Kristianstad, the River Helge å with surrounding wet grazed grasslands and the Lake Hammarsjön in background.
Photo 18 May 2002 by Patrik Olofsson /N.

***Maps:***
Cartographical data for the appendices has been supplied by the Municipality of Kristianstad's Office of Architecture and Office of Engineering, which has also been responsible for the production of these maps.


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# PART I : SUMMARY

## 1. PROPOSED NAME OF THE BIOSPHERE RESERVE:

[It is advisable to use a locally accepted geographic, descriptive or symbolic name which allows people to identify themselves with the site concerned (e.g. Rio Platano Biosphere Reserve, Bookmark Biosphere Reserve). Except in unusual circumstances, Biosphere Reserves should not be named after existing national parks or similar administrative areas]

Kristianstads Vattenrike Biosphere Reserve.

## 2. COUNTRY:

Sweden

## 3. FULFILLMENT OF THE THREE FUNCTIONS OF BIOSPHERE RESERVES

(Article 3 of the Statutory Framework presents the three functions of conservation, development and logistic support. Explain in general terms how the area fulfills these functions.)

### 3.1. "Conservation - contribute to the conservation of landscapes, ecosystems, species and genetic variation"

(Stress the importance of the site for conservation at the regional or global scales)

The proposed biosphere reserve is in Skåne, the southernmost of Sweden's provinces. The area includes the lower drainage basin of the River Helge å in the Municipality of Kristianstad and the coastal waters of Hanöbukten Bay, which forms part of the Baltic Sea. It covers approximately 100,000 hectares and contains within its boundaries landscapes and biological values of regional, national and international importance.

The distinctive morphology and geology of the area, the interface between lakes and running water and the brackish water of the Baltic Sea, and the variations in local climates have created unique conditions for a diversity of land cover types that, in turn, support a large number of ecosystems and species. Many of the values of the area in this cultural landscape are a result of the long-term cultivation of the land, but there are also areas that serve as a refuge for biological values that are not predicated on human activity.

At the heart of the entire area, extending north to south, is an expanse of rich wetlands of international importance (*The Helgeån Ramsar Site*). Other examples of biotopes that are classified as possessing high biological values of international and national importance include stretches of running water, broadleaf forests and the sandy grasslands formerly managed under a rotational system of cultivation and fallow. Within all of these landscapes and ecosystems there are areas of varying extent which possess such high values that they already form a part of, or have been recommended for inclusion in the European Union's Natura 2000 network. There are also 14 nature reserves here.

The proposed biosphere reserve includes 711 species that have been nationally red-listed by the Swedish Species Information Centre. At least 16 species from the EU Habitat Directive (Annex 2) have been recorded in the area. At least 43 species from the EU Birds Directive (Annex 1) breed or rest regularly in the area.

The area is also home to at least 22 species on the global red list (IUCN Red List), including Freshwater Pearl Mussel (*Margaritifera margaritifera*), Cod (*Gadus morhua*), Pond Bat (*Myotis dasycneme*), Great Raft Spider (*Dolomedes plantarius*) and White-tailed Eagle (*Haliaeetus albicilla*).

Many values have already been identified in the area with regard to landscapes, ecosystems and species. However, much work remains to be done before a more exhaustive list of all the valuable species can be made. It likely that many such species will be found here as the area includes a number of ecosystems where there is reason to believe that more species worthy of protection may be living. This provides yet another reason to underline the importance of the area from the perspective of conservation.

### 3.2. "Development - foster economic and human development which is socio-culturally and ecologically sustainable".

(Indicate the potential of the proposed biosphere reserve in fulfilling this objective).

The combination of factors behind the existence of such extensive ecological values in proximity to such a densely populated region of Sweden with such a highly developed agricultural sector, together with the fact that there is a small town located at the very heart of the proposed biosphere reserve makes the area particularly well suited as a pilot site for fostering economic and human development that is socio-culturally and ecologically sustainable. Moreover, the area is no more than 100 kilometres from the centre of the Öresund region and the Danish capital of Copenhagen. This means that those interested in the process can easily participate in or follow the results of the work.

Municipal bodies, agricultural organisations and other stakeholders are already carrying out a number of projects in the proposed biosphere reserve that concern sustainable development. This has already established the area's reputation as a good example, attracting delegations from near and far to learn from the methodologies that have been put into practice and the experiences that have been gained.

The text below outlines the effects that some of these activities have had on the area and provides examples of projects that are either already under way or awaiting implementation.

Agriculture is the main activity on Kristianstadsslätten Plain, which constitutes a large part of the proposed biosphere reserve. At the same time as it is necessary to recognise that an active agricultural sector is an essential prerequisite for the conservation of the values of the cultural landscape, efforts must be made to guide and stimulate those involved to ensure that the agricultural activities within the region are carried out in a manner that is ecologically sustainable.

Forestry is mainly restricted to the higher ground in the western and northern parts of the area. The beech woods growing in the ravines of Linderödsåsen Ridge to the west resemble naturally regenerated forests and constitute some of the area's most valuable forest environments. Parts of the forest within the proposed biosphere reserve have already been environmentally certified.

The extent to which the area has been affected by settlement, buildings and infrastructure varies considerably. The densest concentration of population is in the town of Kristianstad, which is centrally situated in the area. There are a number of small communities and villages on Kristianstadsslätten Plain, while the forested areas remain somewhat more sparsely populated. During the summer there is a significant increase in the number of temporary residents along the coast.

Some of the municipal bodies, companies, organisations and individuals involved in the activities described above are, either individually or jointly, already carrying out a number of

projects which clearly demonstrate the opportunities that exist in the area to foster economic and human development which is socio-culturally and ecologically sustainable. A future biosphere reserve would also facilitate the creation of a common arena that would make it considerably easier than it is today to coordinate the various activities that these different interests represent. There would be many advantages in such an arrangement, not least with regard to the financial aspects and the synergies to be gained by sharing knowledge in this way.

Examples of current and potential activities within the area:

- Preserving the natural and cultural-historical values of the old cultural landscape by using it as a source of new products. Examples include special feed for horses, high-quality meat and ecotourism.
- Developing technologies to economise on the consumption of natural resources and reduce emissions of undesirable substances in the natural landscape. Examples include the production of biogas from waste and landfills for use as fuel for transport and heating, and technology to minimise the rate at which irrigation devices consume water, thus economising on water resources and reducing the leaching of nutrients.
- Planning settlement and infrastructure in a way that is designed to economise on the consumption of natural resources at the same time as it preserves and creates areas for biological diversity, outdoor leisure activities, and recreational pastimes with a natural or cultural focus.

### 3.3. "Logistic support – support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development".

(Indicate current or planned facilities).

There are many examples of environmental education and social information activities in the proposed biosphere reserve. These include not only the range of courses offered by Kristianstad University, but also the work carried out by the Krinova Science Park in Kristianstad and environmental initiatives undertaken by various private companies and agricultural organisations, as well as the lectures and excursions that voluntary organisations arrange for their members and the general public. The Municipality of Kristianstad is the driving force behind many environmental education activities. A large number of municipal offices and services act as key resources and work actively with environmental education and information.

One special approach to environmental education and the demonstration of projects is represented by the *Ecomuseum Kristianstads Vattenrike*. Since 1989 the Ecomuseum has set up around a dozen visitor sites, each with its own information materials, erected a large number of birdwatching towers and laid marked boardwalks through certain areas of the wetlands. The visitor sites in the Ecomuseum attract approximately 150,000 visitors a year.

Over the years the Ecomuseum has built up an infrastructure that provides several of the logistic support functions. This includes a number of visitor sites, which facilitate access to selected areas and provide on-the-spot information both for the general public and for individuals and groups with a special interest in the issues concerned. The Ecomuseum also has vehicles and boats as well as premises which, depending on the circumstances, can be used for projects that are undertaken in cooperation with the Ecomuseum. There is also a comprehensive website that may be used both for acquiring and for delivering information.

*Kristianstad Nature School*, an initiative which also dates from 1989, acts as an extension of the Ecomuseum for schools. The Nature School's target group is pupils in the compulsory school system and in upper secondary schools, and teachers at both schools and preschool facilities. The Nature School is a regular user of the specially prepared visitor sites in the Ecomuseum and, via its outdoor classrooms, it is able to carry out field studies with pupils and teachers.

*Research* in the area has taken place over a long period of time and focused on many different topics. In recent years the Ecomuseum has provided logistic support in certain subject areas, especially for external universities. Kristianstad University carries out its own research projects in the proposed biosphere reserve and there are now plans to establish a research committee at the university in collaboration with the Biosphere Candidate Office, which will have direct links to the biosphere reserve. This new organisation will be responsible for encouraging research, proposing research topics in fields of study that are accorded high priority, and generally coordinating research work in the area. The research committee will consist of, for example, national research institutes, national and local government bodies and local stakeholders.

*Environmental monitoring* has also been carried out over a long period of time and in a variety of different subject areas. State-funded environmental monitoring activities are coordinated by the Swedish Environmental Protection Agency and the County Administrative Board and are currently carried out via ten different programme areas, including Freshwater, Agriculture, Wetlands and Forest. In addition to the environmental monitoring work carried out by the state, numerous important surveys are undertaken by, for example, the municipality, water conservation associations, the university and voluntary organisations. In conjunction with the establishment of the biosphere reserve the County Administrative Board has commenced the extensive task of compiling a list of all environmental monitoring in the area. More than 450 sites are registered under various types of environmental monitoring activity in the biosphere reserve and there are plans to set up a "reference register" with a web presentation for the area.

Existing environmental monitoring operations in Sweden, including those in the biosphere reserve, will in future be supplemented by procedures introduced to comply with requirements for EU member states to follow up the status of, for example, Natura 2000 areas. In addition, there are plans to review current environmental monitoring activities in order to pave the way towards a methodology that will follow up Sweden's 15 national environmental quality objectives more effectively.

In the future the office of the Ecomuseum/Biosphere Candidate Office of Kristianstads Vattenrike will serve as the Biosphere Reserve Office and coordinate the three functions of the biosphere reserve.

## 4. CRITERIA FOR DESIGNATION AS A BIOSPHERE RESERVE

[Article 4 of the Statutory Framework presents 7 general criteria for an area to be qualified for designation as a biosphere reserve which are given in order below.]

### 4.1. "Encompass a mosaic of ecological systems representative of major biogeographic regions, including a gradation of human intervention"

(The term "mosaic" refers to a diversity of natural habitats and land cover types derived from human uses such as fields, managed forests, etc. The term "major biogeographic region" is not strictly defined but it would be useful to refer to the map of the "World Network of Biosphere Reserves" which presents 12 major ecosystem types at a global scale).

The biogeographic region to which the area belongs is known as "the temperate and sub-polar broadleaf forests or woodlands" ("the Continental region" according to the classifications used by the EU). In terms of geology, climate and vegetation, Sweden's southernmost province, Skåne, constitutes a northern outpost of a type of landscape that exhibits certain of the characteristics of Central Europe. The proposed biosphere reserve in the north-eastern corner of Skåne reflects several of these Central European traits, but thanks to what is, in comparison with Central Europe, a relatively low population density, many of the area's varied ecosystems have been less intensively exploited and many of the biological values remain.

The area includes the major part of the lower drainage basin of the River Helge å and the coastal waters of Hanöbukten Bay. The central section comprises the flat expanse of Kristianstadsslätten Plain, underlain by sedimentary rocks of the Cretaceous Period. The western parts consist of the primary horsts of the Linderödsåsen and Nävlingeåsen Ridges, while to the north the plain is bordered by the Archean rocks of South-West Swedish gneiss. In the south-east the terrestrial areas of the proposed biosphere reserve terminate in the long, sandy landscape of coastal dunes along the shore of Hanöbukten Bay in the Baltic Sea. Off the coast, the area includes level, sandy sea-beds and undulating morainic beds.

The area has a warm temperate climate with average temperatures of $+16.6^{o}$ C in the warmest summer month and $-0.9^{o}$ C in the coldest winter month. Mean annual precipitation is 562 mm measured at approximately 10 metres a.s.l. There are, however, substantial variations within the area both as regards temperature and precipitation, with, for example, colder and wetter areas of high ground in the south-west and north, and milder, dryer areas along the coast.

The area includes a small town with approximately 29,000 inhabitants. There are also a number of communities on Kristianstadsslätten Plain. On the coast is the urban area of Åhus, and during the summer months visitors flock to some 1,700 holiday homes along sections of the coast. The forested areas in the south-western and northern parts of the area are less densely populated.

In the centre of the area, along the course of the River Helge å and around the two lakes Araslövssjön and Hammarsjön, is a Ramsar convention site extending over approximately 8,000 hectares with only a few permanent residents. Close by, however, are the town of Kristianstad and a number of villages. Kristianstadsslätten Plain is predominantly agricultural land: large acreages are under intensive cultivation, while other areas are relatively extensively cultivated. Deciduous trees and conifers are felled, harvested and planted in the areas of forest, but here, too, forestry remains less intensive in certain parts than in others.

The proposed biosphere reserve encompasses a large mosaic of ecosystems: these are a result of the natural conditions in the area and varying degrees of human influence arising from the type of land cover, both historically and in the present day. Here is everything from the more

natural ecosystems in lakes, running water, coastal and marine areas, etc. to ecosystems exhibiting high levels of biodiversity that have been created by human intervention, such as seasonally inundated grasslands, areas of land managed under a rotational system of fallow and cultivation, open outfield pastures with freestanding ancient trees and pastures in wooded environments.

### 4.2. "Be of significance for biological diversity conservation"

(This should refer not only to the numbers of endemic species, or rare and endangered species at the local, regional or global levels, but also to species of globally economic importance, rare habitat types or unique land use practices (for example traditional grazing or artisanal fishing) favouring the conservation of biological diversity. Give only a general indication here.)

The area displays a great deal of variation. There are primary horsts covered with deciduous forests and scored by ravines with swiftly flowing streams: but there is also flat agricultural land underlain by sedimentary rocks and covered with postglacial sediments where a wide, slow-flowing river runs between two large lowland lakes before passing through an extensive area of wet forest prior to finally discharging into the Baltic Sea. There are also important remnants of old land cover systems, such as seasonally inundated grasslands used for grazing and haymaking and dry, calcareous sandy grasslands grazed by domestic animals. All of this provides the conditions for considerable biological diversity, the preservation of which is a pressing concern not only from a local, but also from a regional, national and international perspective.

An area of wetland of international importance, designated as a Ramsar Convention site, extends north to south through the very heart of the area. What is of special significance is that water links this entire Ramsar area via Hanöbukten Bay and the Baltic Sea with the oceans beyond. This means that since time immemorial migratory fish have been able to make their way from the open sea into the freshwater environments of the Ramsar area. For some years now work has also been under way to remove migration obstacles for fish upstream of the Ramsar area, both within and outside the proposed biosphere reserve. A further highly significant factor is the natural, annual variations in water levels in the Ramsar area: the mean average annual variation is approximately 1.4 metres. This, together with human influence in the form of managing areas for grazing and haymaking, is one of the basic prerequisites for ensuring the high biological values of the seasonally inundated grasslands.

Other important areas whose biological values accord them high status include the River Vramsån, which is designated in accordance with the EU Habitat Directive. The Swedish branch of WWF has also selected the River Vramsån as one of the most valuable watercourses in Sweden because of the high biological values it possesses. The broadleaf forests on the north-eastern slopes of Linderödsåsen Ridge have also been recognised by the Swedish WWF as especially valuable because of their high biological values.

The future biosphere reserve includes:

- 34 Natura 2000 sites with a total area of 4,927 ha in accordance with the EU Habitat Directive (Sites of Community Interest: SCI's)
- 4 Natura 2000 sites with an area of 4,376 ha in accordance with the EU Birds Directive (Special Protection Areas: SPA's)
- At least 16 of the species designated in the EU Habitat Directive (Annex 2) are represented within the area
- At least 43 of the species mentioned in the EU Birds Directive (Annex 1) regularly rest or breed within the area
- At least 22 species are globally red-listed

- At least 711 species are nationally red-listed, including:
  59 species of bird
  8 species of fish
  5 species of reptile and amphibian
  10 species of mollusc
  232 species of beetle
  86 species of butterfly
  106 species of vascular plant

Of the current 27 national action plans that are being implemented in Sweden to protect endangered habitats and species, the following are directly relevant to the proposed biosphere:

- Xeric sand calcareous grasslands
- Peregrine Falcon (*Falco peregrinus*)
- Freshwater Crayfish (*Astacus astacus*)
- European Catfish (*Silurus glanis*)
- Stone Loach (*Barbatula barbatula*)
- Gudgeon (*Gobio gobio*)
- Freshwater Pearl Mussel (*Margaritifera margaritifera*)
- Natterjack Toad (*Bufo calamita*)
- Hermit Beetle (*Osmoderma eremita*)
- Pine Borer *(Chalcophora mariana)*
- Field Fleawort (*Tephroseris integrifolia*)
- Tawny Pipit (*Anthus campestris*)

The area is also extremely important for resting birds, for example:

- White-tailed Eagle (*Haliaeetus albicilla)*.
  Between 150 and 200 White-tailed Eagles visit the proposed biosphere reserve and the nearby coast during the winter. At one and the same time it is possible to see as many as 50 to 75 eagles in the area. This makes the area one of the major wintering sites for White-tailed Eagles in Sweden.
- Geese (*Anseri*)
  The area is an important resting and wintering place for several species of goose. For example, more than 15,000 Bean Geese (*Anser fabilis*) are regularly reported from the area. This number constitutes approximately 15% of the total West Siberian/North-West European population of the Bean Goose.
- Crane (*Grus grus*).
  In recent years 3,000–5,000 cranes have rested in the proposed biosphere reserve on the northern spring migration.

### 4.3. "Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale"

(Describe in general terms the potential of the area to serve as a pilot site for promoting the sustainable development of its region (or "eco-region")

There are numerous activities within the proposed biosphere reserve which are well suited to demonstrate approaches to sustainable development, inasmuch as these activities are representative of the situation in a much larger region.
Activities worthy of special mention in this context are, for example, the development of agriculture, forestry, tourism, recreation, trade and industry, in addition to settlement and infrastructure. In this respect, the area encompasses a range of activities that, to some degree, compete with one another for the space available at the same time as they also compete with

the high conservation values that are linked to existing landscapes, ecosystems and species. Providing examples of how these diverse interests may be reconciled in a way that demonstrates the objective of sustainable development is a challenge which has already been taken up in the area and one which it is highly appropriate to expand in scope and depth.

Certain of the activities carried out in the area are a prerequisite to conserving landscapes, ecosystems and species. One such example is agriculture. The seasonally inundated grasslands that are used for grazing and haymaking, and the open sandy grasslands that are used for grazing and only very extensive farming both serve as good examples of the types of landscape with very high values that exist thanks to agricultural activity.

However, few (if any) agricultural companies are able to make a living solely from this type of land management, but must instead rely on income from other sources to supplement their earnings, for instance from conventional, intensive agriculture. It is important to demonstrate how the various needs can be met within the parameters of sustainable development.

The fact that approximately 68,000 people live in the area (29,000 of them in the town of Kristianstad at the very heart of the proposed biosphere reserve) provides excellent opportunities to examine and demonstrate approaches to sustainable development. With such high conservation values in and adjacent to built-up areas, the circumstances are very favourable for demonstrating examples of sustainable development to a broad spectrum of society.

The existence of a well established Ecomuseum with marked paths, boardwalks, signs and a number of visitor sites that provide information in the proposed biosphere reserve means that the basic structure for on-site demonstration facilities is already in place. Certain visitor sites in the Ecomuseum have already been conceived and built as demonstration sites, including a full-scale example that shows various methods by which a straight ditch in an area of intensively cultivated agricultural land can be restored to the type of watercourse that, from an ecological point of view, works much better. This facility is run in collaboration with a local agricultural college.

Here is a brief list of examples of other activities which are already under way or in the planning stage and which demonstrate approaches to sustainable development in the proposed biosphere reserve:

- Restoring seasonally inundated grasslands by developing new technology to recreate the old hay meadows and by creating a market for the sale of high quality hay.
- Creating ponds and wetlands to contribute to the containment of diffuse nutrient leaching and promote biodiversity.
- Cultivating reeds on poor agricultural land to create a renewable source of energy, contain diffuse nutrient leaching and improve biological values.
- Developing the municipal “Spirit of Food” profile founded on sustainable development that pays due concern to values such as the conservation of landscapes, ecosystems and species.
- Utilising organic waste from the food industry, agriculture, domestic households, etc. for the production of biogas as fuel for transport.
- Utilising gas from landfill sites for district heating.
- Managing extreme water flows and floods within and beyond the urban centre of Kristianstad, while simultaneously maintaining the natural water regime with annual variations in water levels.

- Encouraging the development of ecotourism activities in the form of, for example, accommodation, guided tours and transport.

In addition to the opportunities that are provided for local residents, educational institutions and trade and industry to participate in and acquaint themselves with approaches to sustainable development, the location of the area (approximately 100 km from the heart of the Öresund region in which there are several universities and a large number of expansive companies) provides extremely good potential for spreading information.

### 4.4. "Have an appropriate size to serve the three functions of biosphere reserves"

(This refers more particularly to (a) the surface area required to meet the long term conservation objectives of the core area(s) and the buffer zone(s) and (b) the availability of areas suitable for working with local communities in testing out and demonstrating sustainable uses of natural resources.)

The area demarcated as the proposed biosphere reserve includes the lower drainage basin of the River Helge å in the Municipality of Kristianstad and the coastal waters of Hanöbukten Bay, which forms part of the Baltic Sea. These boundaries encompass those parts of the River Helge å's drainage basin which not only have the highest concentration of values, but which also share a special set of characteristics that distinguish them from other parts of the drainage basin. The inclusion of the coastal areas and offshore shallows in the Baltic Sea outside Åhus unites the limnic and (in parts) marine ecosystems.

The area includes core areas which vary both in size and with regard to the conservation objectives. The surface area of these core areas is deemed to be appropriate to meet the long-term conservation objectives.

The extent of the area and the physical distribution of the various zones provide good opportunities to fulfil the functions for conservation, development and logistic support. The size and spread of population in the various zones within the area also makes the area well suited as a biosphere reserve. The proposed biosphere reserve has a total area of 104,375 ha (approximately 1 044 $km^2$), which comprises 90,515 ha (approximately 905 $km^2$) of freshwater and terrestrial environments and 13,860 ha (approximately 139 $km^2$) of marine environments.

**The Kristianstads Vattenrike Biosphere Reserve**

| | | |
|---|---|---|
| Total area | 104,375 ha | |
| Core area | 7,179 ha | 7 % |
| Buffer zone | 22,900 ha | 22 % |
| Transition area | 74,297 ha | 71 % |

### 4.5. Through appropriate zonation :

The zonation that will apply in the proposed Kristianstads Vattenrike biosphere reserve is not contingent on any new legislation, but is based exclusively on the provisions of the Swedish Environmental Code.

**(a) "a legally constituted core area or areas devoted to long term protection, according to the conservation objectives of the biosphere reserve, and of sufficient size to meet these objectives" ?**

(Describe the core area(s) briefly, indicating their legal status, their size, the main conservation objectives)

The core areas consist of nature reserves, habitat protection areas and Natura 2000 areas, all of which are protected by Swedish law in accordance with the Swedish Environmental Code, which came into force on 1 January 1999. The core area in the proposed biosphere reserve covers 7,179 ha. Protected nature reserves cover 1,855 ha. Natura 2000 sites comprise 4,927 ha in accordance with the terms of the Habitat Directive (SCI´s) , and 4,376 ha in accordance with the Birds Directive (SPA´s). Several areas are both Natura 2000 sites and nature reserves.

The conservation objectives in the core areas are mainly linked to lakes and the seasonally inundated grasslands, wet forests and shoreline forests contiguous to these lakes. In addition to these types of landscape and ecosystem, the core areas include running water, dry grasslands with elements of xeric sand calcareous grasslands, outfield pastures, areas of sand dunes and forested areas.

**"(b) a buffer zone or zones clearly identified and surrounding or contiguous to the core area or areas, where only activities compatible with the conservation objectives can take place..."**

(Describe briefly the buffer zones(s), their legal status, their size, and the activities which are ongoing and planned there).

The buffer zones in the proposed biosphere reserve cover an area of 22,900 ha. They consist mainly of areas designated as a Ramsar site, areas of national interest for the purposes of nature conservation and shore protection areas. Those parts of the Ramsar site, areas of national interest for the purposes of nature conservation and shore protection areas that are also nature reserves or Natura 2000 sites form part of the core area, whereas the surrounding land forms part of the buffer zones.

Forest with nature conservation agreements, land which is listed as municipally owned nature conservation areas with non-statutory protection, and state-owned nature conservation areas which have not yet been accorded formal protection have also been classified as buffer zones.

The Ramsar site, which is also an area of national interest for the purposes of nature conservation, is covered by Swedish legislation according to the provisions of the Environmental Code. The same applies to the shore protection areas. Land that is included as municipally owned nature conservation areas with non-statutory protection comes under the remit of municipal policy decisions, whereas the state-owned nature conservation areas have been purchased with the intention of declaring them nature reserves. Nature conservation agreements for forests are regulated by civil law.

The buffer zones consist mainly of privately owned land and include, for example, land used for forestry and agriculture on the margins of valuable, seasonally inundated grasslands or forested areas. The buffer zones also include running water, lakes, areas of sand dunes and coastal areas. In addition to forestry and agriculture other activities carried out within the buffer zones include tourism, recreational activities such as fishing and other nature-oriented pastimes, education, research and monitoring.

The buffer zones serve as a good indicator of where the high conservation values are to be found in the proposed biosphere reserve. This knowledge will be used to strengthen the financial and practical opportunities for supporting initiatives such as the following examples of activities that are planned in the buffer zones:

- Increasing understanding of the area by research and by utilising local residents' knowledge of the area.
- Reaching mutual agreement on favourable financial terms and practical structures for the use of the buffer zones in a way that will have a positive impact on the core areas.
- Working together to identify and create the conditions for using the buffer zones in a way which favours the conservation values both in the buffer zones and in the core areas, through, for example, ecotourism, new land cover initiatives and restoration projects.

**"(c) an outer transition area where sustainable resource management practices are promoted and developed"**

(The Seville Strategy gave increased emphasis to the transition area since this is the area where the key issues on environment and development of a given region are to be addressed. The transition area is by definition not delimited in space, but rather is changing in size according to the problems that arise over time. Describe briefly the transition area as envisaged at the time of nomination, the types of questions to be addressed there in the near and the longer terms. The size should be given only as an indication.)

The transition area in the proposed biosphere reserve covers 74,297 ha. Less than 10 % of this land is municipally owned or state-owned. Most of the area consists of agricultural land, forests and built-up areas or scattered settlement.

There is enormous potential to promote approaches to sustainable development in this area, both by means of the environmental work that takes place in, for example, the agricultural and forestry sectors, and via the far-reaching environmental projects that are undertaken by the Municipality of Kristianstad.

In view of the fact that work is already taking place in several sectors of society on a large number of highly commendable initiatives for sustainable development within the transition area, the future emphasis will shift to providing practical and financial support for these initiatives. The ambition here is that the biosphere reserve, in its role as a model for sustainable development, will facilitate the provision of resources.

Seen over the longer term, the hope is that voluntary agreements will be reached to permit the creation of more buffer zones in what is initially the transition area.

**4.6 "Organizational arrangements should be provided for the involvement and participation of a suitable range of *inter alia* public authorities, local communities and private interests in the design and the carrying out of the functions of a biosphere reserve."**

(Are such arrangements in place or foreseen)

When the Ecomuseum Kristianstads Vattenrike was first established in 1989, activities centred on a broad programme of information and nature conservation work with a firm focus on the central area of rich wetlands. Today the work has expanded to embrace all the functions in a biosphere reserve, and some activities are now also undertaken outside the wetlands area.

Over the course of time all operational activities have been coordinated by the Ecomuseum's director. In more recent years a nature conservation coordinator and an information secretary

have also been engaged to assist with operations. The cost for these posts has been covered chiefly via project funding. Without this support it would not have been possible to maintain the close contacts we now enjoy with various official bodies, organisations and local partners. Each of the many project groups that play their part in current operations includes a liaison officer tasked with maintaining communication with the Ecomuseum.

As work has developed, a special group for consultative meetings has also been established. The 25 or so members of *Samrådsgruppen för naturvård i Kristianstads Vattenrike* ("The Consultation Group for Nature Conservation in Kristianstads Vattenrike") represent a variety of interests in the area, including local organisations, local government officers and politicians, as well as representatives for certain regional authorities.

This consultation group meets several times a year, and at least one of the meetings is held outdoors on site somewhere in the area to enable members of the group to acquaint themselves with an issue of topical interest: for example, an on-the-spot update on future operational plans, an opportunity to see the result of work carried out, or familiarisation with a specific problem that requires discussion. The minutes of the meetings are also distributed to representatives of authorities and organisations at central level. The role of the consultation group is purely advisory, but thanks to the fact that it represents such a broad spectrum of interests, it has been able to make clear recommendations and submit proposals that have subsequently been adopted by a number of stakeholders.

Currently the main focus of the consultation group's work is on the wetlands areas, but as work with the new "theme areas" gradually begins to extend the scope of operations, the composition of the group and its working methods will be adapted to reflect the needs of the biosphere reserve as a whole.

### 4.7. Mechanisms for implementation

**Does the proposed biosphere reserve have :**

**"(a) mechanisms to manage human use and activities in the buffer zone or zones" ?**
(Briefly describe)

Some activities are regulated via existing national legislation and municipal policy relating to municipally owned nature conservation areas with non-statutory protection. In addition certain areas of land are regulated by the EU's environmental aid for conservation of biodiversity and cultural heritage values of semi-natural pastures and mown meadows. Henceforward it may be possible to reach further voluntary agreements relating to municipally owned or privately owned land.

**"(b) a management plan or policy for the area as a biosphere reserve" ?**
(Briefly describe)

A management plan/policy (the third such action plan) has recently been adopted for the area of rich wetlands within the future biosphere reserve (for the Helgeån Ramsarsite). Once final approval has been granted for the establishment of the planned biosphere reserve, this plan will be revised in a series of stages. The new land cover policy and the management plan for the biosphere reserve can be drafted and developed in a similar way to that in which the various action plans have already been produced. Regular revisions and updates will be made

as work in the biosphere reserve progresses and as, for example, the focus shifts increasingly towards work with the new theme areas.

**"(c) a designated authority or mechanism to implement this policy or plan" ?**
(Briefly describe)

As things stand today, the office of the Ecomuseum Kristianstads Vattenrike serves as a platform for coordination and operational activities that include, for example, the distribution of information via our website, printed materials, outdoor visitor sites in the area and projects relating to nature conservation, planning, research, etc. – all within the ambit of the operations of Kristianstads Vattenrike.

There are plans to establish a Biosphere Reserve Office in the future biosphere reserve. This office will extend the scope of its operations, on the one hand to fulfil the three functions which a biosphere reserve needs to serve, and on the other to be able to initiate, support and coordinate work with the proposed theme areas: "Sandy grasslands formerly managed under a rotational system of cultivation and fallow", "Rich woods and forests on the slopes of Linderödsåsen Ridge", "The coastal waters of Hanöbukten Bay", etc (se Ch.13).

The future Biosphere Reserve Office will not exercise any official authority as no new rules or ordinances will be created. Instead the office's function will be to coordinate activities within the area and to support, initiate and follow up activities carried out by other parties that the meet the biosphere reserve's criteria for conservation and development based on the management plan or policy that exists for the area. The Biosphere Reserve Office will also be able to assist with the provision of data, documentation and proposals on which local, regional and national bodies will be able to base their decisions.

The future biosphere reserve will also include a *Samrådsgrupp för Biosfärområde Kristianstads Vattenrike* ("Consultation Group for the Kristianstads Vattenrike Biosphere Reserve Area") evolved from the consultation group for nature conservation in Kristianstads Vattenrike which has been actively involved in the area for many years. The new consultative group will include representatives from central, regional and local authorities, organisations, local entrepreneurs, etc. Involving local society in, among other things, a variety of concrete projects in the biosphere reserve will provide an important basis for collaboration when formulating and implementing the management plan and the land cover policy.

**"(d) programmes for research, monitoring, education and training"?**
(Describe briefly research/activities monitoring (ongoing or planned) as well education and training activities)

*Research* has been carried out in the area in many different topics and subject areas over a very long period of time. Ongoing research with regard to activities in Kristianstads Vattenrike has its closest geographical links to the area via the research institute in the local university, but research institutes based elsewhere in Sweden also use the area for their investigations. In order to encourage research, provide proposals for prioritised areas of research and coordinate work in the area, a research committee should be established. This should have its administrative base at the University of Kristianstad.

*Environmental monitoring* has been carried out in the area by various parties for a number of years. In future, existing environmental monitoring activities will be complemented and adapted in line with international, national and local guidelines and wishes. The work will still be carried out by a number of different bodies and it is to be hoped that the establishment of

the biosphere reserve will make it possible to reinforce their efforts, render their work more efficient and make it accessible to specialists and the general public alike. One aspect of the future work will be to participate in the global exchange of facts that takes place via BRIM (Biosphere Reserve Integrated Monitoring).

*Education and work experience programmes* have been carried in the area out for a number of years, particularly in conjunction with the activities of the Ecomuseum and the Nature School. However, many other parties are involved in these activities, including the University of Kristianstad, the Municipality of Kristianstad and various companies, organisations and authorities that conduct environmental education, training and work experience programmes in the area. The future biosphere reserve, which is committed to becoming a model area for conservation and development, will in this respect serve as an important resource for education and work experience.

## 5. ENDORSEMENTS

### 5.1 Signed by the authority/authorities in charge of the management of the core area(s):

Responsibility in Sweden for managing the forms of protection pertaining to the core areas rests at institutional level within national and local government agencies. Signatures from representatives for all the bodies concerned are provided under 5.3 below.

### 5.2 Signed by the authority/authorities in charge of the management of the buffer zone(s):

There is no institutional responsibility in Sweden for managing the forms of protection pertaining to the buffer zones. However, there is a general responsibility and, in certain instances, a statutory supervisory responsibility in accordance with current Swedish legislation. Signatures from representatives for all the bodies concerned are provided under 5.3 below.

### 5.3 Signed as appropriate by the National (or State or Provincial) administration responsible for the management of the core area(s) and the buffer zone:

*For Natura 2000 areas within the core areas*

Institution: **Swedish Environmental Protection Agency (EPA)**

Title: Deputy Director-General

Date: 2004-11-25

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Full name: MATS OLSSON

Institution: **County Administrative Board of Skåne**

Title: Head of the Department of Environmental Affairs

Date: 041110

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Full name: ELISABETH HELLMO

*For Nature Reserves within the core areas*

Institution: **Swedish Environmental Protection Agency (EPA)**

Title: Deputy Director-General

Date: 2004-11-26

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Full name:

Institution: **County Administrative Board of Skåne**

Title: Head of the Department of Environmental Affairs

Date: 04 11 19

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Full name: ELISABETH HELLMO

Institution: **Municipality of Kristianstad**

Title: Head of land and development department

Date: 2004. 12. 13

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Full name: Ingvar Lövkvist
Mark- och exploateringschef

*For Habitat Protection Areas (forests) within the core areas*

Institution: **Regional Forestry Board of Södra Götaland**

Title: Regional Chief Forester

Date: 041209

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Full name:
Jan Linder

*For the Helgeån Ramsar Site within the buffer zone*

Institution: **Swedish Environmental Protection Agency (EPA)**
Title: Deputy Director-General
Date: 2004-11-25

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Full name:

Institution: **County Administrative Board of Skåne**
Title: Head of the Department of Environmental Affairs
Date: 041110

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Full name: ELISABETH HELLMO

*For areas of national interest for the purposes of nature conservation, areas of municipally-owned land for nature conservation purposes, and shore protection areas within the buffer zones*

Institution: **Municipality of Kristianstad**
Title: MUNICIPALITY ARCHITECT
Date: 041213

---

Full name: TOMAS THEANDER

*For areas of state-owned land for nature conservation purposes within the buffer zones*

Institution: **County Administrative Board of Skåne**
Title: Head of the Department of Environmental Affairs
Date: 041110

---

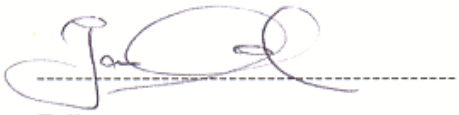
Full name: ELISABETH HELLMO

*For forests with Nature Conservation Agreements within the buffer zones*

Institution: **Regional Forestry Board of Södra Götaland**

Title: Regional Chief Forester

Date: 041209



Full name: Jan Linder

**5.4 Signed by the authority/authorities, elected local government recognized authority or spokesperson representative of the communities located in the transition area.**

Institution: **Municipality of Kristianstad**

Title: Chairman of the Executive committee

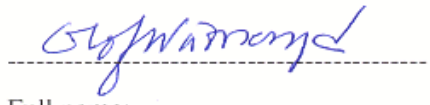
Date: 2004-12-15

Full name: Heléne Fritzon

**5.5 Signed on behalf of the MAB National Committee or focal point:**

Title: Professor

Date: 041215



Full name: OLOF WÄRNERYD

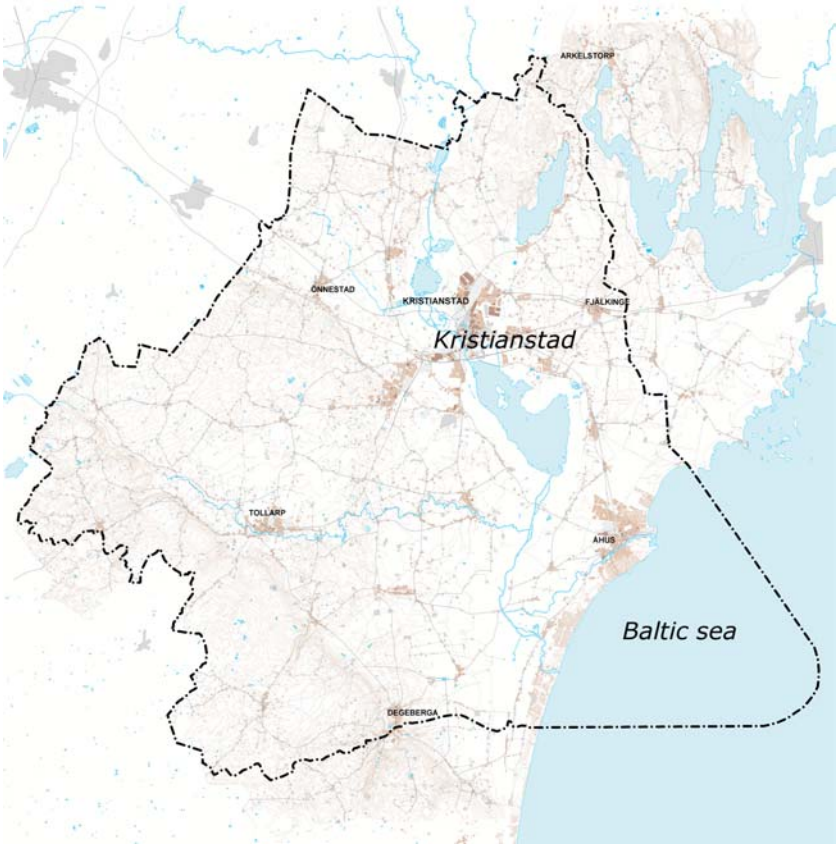
# PART II : DESCRIPTION

## 6. LOCATION ( LATITUDE AND LONGITUDE ):

[Indicate in degrees - minutes, seconds the coordinates of the central point AND the external limits of the proposed biosphere reserve to be used for a Geographic Information System (GIS) ]

*Biosphere Reserve – central point:*
Kanalhuset (The Canal House Outdoor Museum) in Kristianstad 56°01’57’’ N, 14°08’58’’ E

*Biosphere Reserve – external limits:*
Northern limit: 56°10’26’’ N, 15°13’15’’ E
Western limit: 55°56’13’’ N, 13°45’04’’ E
Southern limit: 55°48’14’’ N, 13°58’42’’ E
Eastern limit: 55°51’33’’ N, 14°28’42’’ E


***Map 1***
***Extent of the biosphere reserve***
The biosphere reserve includes the drainage basin of the River Helge å in the Municipality of Kristianstad and the coastal waters of Hanöbukten Bay.

## 7. AREA (see map):

Total: 104,375 ha

### 7.1. Size of terrestrial Core Area(s):

6,958 ha.

**If appropriate, size of marine Core Area(s):**

221 ha.

### 7.2. Size of terrestrial Buffer Zone(s):

16,184 ha.

**If appropriate, size of marine Buffer Zone(s)**:

6,715 ha.

### 7.3. Approx. size of terrestrial Transition Area(s) (if applicable):

67,673 ha.

**If appropriate, approx. size of marine Transition Area(s):**

6,924 ha.

### 7.4. Brief rationale of this zonation (in terms of the various roles of biosphere reserves) as it appears on the zonation map.

In the cases where a different type of zonation is also in force at the national level, please indicate how it can coexist with the requirements of the biosphere reserve zonation system.

Zonation of the proposed biosphere reserve has been determined on the basis of current Swedish legislation. In consequence of this, the zones do not involve any new restrictions, but are designed to facilitate the prioritisation of different forms of support to protect and develop the values of the area. The zonation, where the protected core areas are surrounded by buffer zones, makes clear the ecological and socio-economic interdependence between the various areas.

A number of theme areas have been identified (see Chapter 13), and over time the zonation will be developed and revised within the respective theme area. The most detailed zonation at the time this nomination is submitted is within theme area 1 “Wetlands adjoining the River Helge å”, an area which is covered by the Ramsar Convention. When the focus shifts between the various theme areas, this is not merely a question of zonation, but more significantly of initiating a programme of practical work with the three functions of conservation, development and logistic support. In this respect the wetlands area provides a good example: practical initiatives related to conservation, development and ecomuseum activities have been put into action here since 1989. The results of this work include an action plan for nature conservation, closer liaison with local users, increases in the acreage of managed, seasonally inundated grasslands, increases in the numbers of breeding pairs of threatened species of bird such as Black-tailed Godwit (*Limosa limosa*), improved opportunities for the general public to experience and understand the values in the landscape as a result of the ecomuseum’s information facilities and the river excursion boat, and greater opportunities for schoolchildren to acquaint themselves with the values thanks to the active outreach programme and website of the Nature School. It has also resulted in increased, long-term protection for the values as a result of the establishment of nature reserves, first and foremost in areas owned by the state or the local municipality.

Henceforward zonation will be integrated into municipal town and country planning activities via what is known in Sweden as "the comprehensive plan", which serves as a long-term vision for municipal development with regard to the future utilisation of land and water resources, according to the Planning and Building Act.

**Description of the zones**

***The core areas*** consist mainly of lakes and contiguous, seasonally inundated grasslands, wet forests and shoreline forests. In addition, the core areas also include running water, dry grasslands with elements of xeric sand calcareous grasslands, outfield pastures, areas of sand dunes, smaller forested areas and part of a raised bog. These areas have high natural values and enjoy the protection afforded by Swedish legislation to nature reserves, habitat protection areas and Natura 2000 areas.

***The buffer zones*** consist mainly of privately owned land and include forests, agricultural land on the margins of valuable, seasonally inundated grasslands or forested areas, running water, lakes, areas of sand dunes and coastal areas. The limits of the buffer zones are demarcated by other previously identified boundaries, such as the Ramsar site, areas of national interest for the purposes of nature conservation, shore protection areas, forests covered by nature conservation agreements and municipally owned nature conservation areas with non-statutory protection.

***The transition area*** in the proposed biosphere reserve consists mainly of agricultural land, forest, built-up areas and scattered settlement.

## 8. BIOGEOGRAPHICAL REGION:

[Indicate the generally accepted name of the biogeographical region in which the proposed Biosphere Reserve is located. You may wish to refer to the map of the World Network of Biosphere Reserves presenting 12 major ecosystem types.]

Classification by UNESCO/MAB: Temperate and sub-polar broadleaf forests or woodlands.
Classification by EU: Continental region.

## 9. LAND USE HISTORY

[If known, give a brief summary of past/historical land use(s) of the main parts of the proposed biosphere reserve]

**Summary**

The proposed biosphere reserve comprises a rich cultural landscape where, since the Stone Age, human intervention has shaped the land on the basis of its natural potential. Over the millennia human use has changed from an extensive exploitation of the land to a more intensive one, but even today there remain vestiges of the old peasant landscape.

The light sandy soils of Kristianstadsslätten Plain were first cultivated in the Stone Age, and today the flat plain is an open area of cultivation. The high ground to the north and south, which is more difficult to cultivate with modern machinery, is dominated by planted forests. In the central wetland area the wet grasslands have been in continuous use for almost 1,000 years. From early times people here saw the wet grasslands, which flooded annually and were fertilised naturally, as a vital part of their lands, not least because this is where they harvested winter fodder for their beasts. Today more than 1,600 hectares of this old cultural landscape still remain in the form of open wet grasslands flooded annually and maintained by being used for grazing and haymaking. Other important vestiges of the old peasant landscape within the proposed biosphere reserve are the extensive sandy fallow fields, which are the remnants of

the rotational system of cultivation and fallow that was commonly practised on the dry, thin sandy soils.

Many of the roads and lines of communication that we still follow today were originally established in prehistoric times. These routes were primarily localised to ridges and other high features in the landscape, and a large number of archaeological remains and smaller finds have been discovered along these ancient ways.

The exploitation of the landscape in the proposed biosphere reserve is the subject of an interdisciplinary research project being carried out by Kristianstad University, entitled *"The Helge Å River Valley. Landscape in a Long-Term Perspective: Man and Biosphere"*. The project will contribute vital knowledge about land use and the exploitation of the landscape. The following description should be regarded as a brief summary of the knowledge currently available to us, which, to a great extent, is based on the comprehensive cartographic material that is available in Sweden.

**Prehistoric times (12,000 BC to approximately 1000 AD)**
After the ice sheet had begun to retreat from the southern parts of the biosphere reserve in around 13,000 BC, plants and animals started to return, followed a few thousand years later by the first wave of settlers, who lived as hunters, fishermen and gatherers. The earliest archaeological remains discovered within the proposed biosphere reserve are to be found at Fjälkinge Backe Hill and have been dated from about 11,000 BC. During the Neolithic Period (4,200 BC to 1,800 BC) people began to cultivate the land. Farming was carried out as a rotational system of cultivation and clearance on light soils; small areas were cleared or burned at regular intervals to provide a few harvests, after which they were used primarily for grazing. Over a period of time the central parts of the plain were gradually transformed into more open grazing land. This rotational system of cultivation and fallow, which required large areas of land, continued during the Bronze Age (1,800 BC to 500 BC), when cultivation also spread to areas far beyond those farmed today. There are still traces of cultivation from the late Bronze Age and early Iron Age on the high reaches of the hills and ridges, for example on Linderödsåsen Ridge.

During the early Iron Age (500 BC to 400 AD) a change in the climate meant that it became colder and wetter. Animals had to be kept indoors during the winter, and the need for winter fodder increased. Naturally open lands were then used as hayfields, where the grass was cut and dried to make hay for winter fodder.

**The age of the village landscape (approximately 1000 AD to 1800 AD)**
At the end of the Iron Age and the dawning of the Middle Ages, a large part of the settlement became locked into its historical locations, where it was to remain until the time of the great enclosure reforms in the nineteenth century. The village became the natural unit on the plain, while isolated farms were primarily to be found in areas that were more difficult to cultivate. Before the advent of the enclosures, village lands were divided into infields and outfields. The infields (those areas requiring human management) consisted of arable fields and hay meadows, while the so-called outfields were forest and pasture. The infields were fenced in order to protect them against the livestock which grazed freely in the outfields.

***The use of meadows***
This period saw the beginning of the use of meadows. Within the proposed biosphere reserve more than a dozen villages adjoin the wetlands along the River Helge å downstream from Torsebro. The villages lie relatively high and dry, but are still near to the wetlands. In times gone by the hay from the wet grassland was transported to barns in the villages to be used as animal fodder during the winter. In the spring the manure from these animals was spread over the poor sandy soil of the fields. The natural process of fertilisation of the wet grasslands that was set in motion by the annually recurring high water level was, therefore, transmitted via the hay to the byre to feed the animals whose manure subsequently provided the nutrients to sustain the crops in the fields. This close interplay between field and meadow, where the amount of hay determined how many animals one could keep over the winter, and the amount of manure they provided determined the area of arable fields and the size of the harvest, provides the explanation for the frequently encountered expression "Meadow is the mother of field".

***Rotational system of cultivation and fallow***
Large areas of the plain had soils that were so poor they could only be cultivated every seven to nine years. As a result, the plots that were cultivated were moved from year to year. In the intervening period the land lay fallow and was used as pasture. This so-called rotational system of cultivation and fallow, in which only a small part of the land was cultivated each year, was described by Carl Linnaeus on his journey between Åhus and Kristianstad in the summer of 1749. Large areas of these fields still remain within the proposed biosphere reserve. One of them is an area of outwash sand known as Ripa Sandar, located in the southernmost reaches of the glaciofluvial sediments of Rinkaby-Oppmannaåsen Ridge.

***Villages on the plain with livestock on the ridge***
Farms and villages had to have arable fields, haymaking meadows and pastures. Sometimes this meant that farmers had to fetch hay and drive livestock a great distance from their farms. In more recent times (from 1536 to the present day) we know that several villages on the plain (for example, Norra Åsum and Everöd) had complementary pastures, known as "commonage", high up on Linderödsåsen Ridge. Some villages also had complementary marshy hay meadows far from the nucleus of the village. One of these was Everöd, which harvested hay from wetland grass – and still does – some eight kilometres away at Everöd prästänge ("Everöd's Church Meadow"), close to the hamlet of Sjögård.

***Towards an ecological crisis***
From the sixteenth century to the eighteenth an increased demand for grain from the continent and elsewhere led to the cultivation of the meadows, upsetting the delicate balance between fields and meadows. This new cultivation brought about a reduction in the production of hay, ultimately providing less manure for the existing fields, which became impoverished. New areas were brought into cultivation only to become impoverished in their turn, giving rise to a vicious circle in which clearance of the forest, erosion and impoverishment of the soils threatened to plunge the landscape into ecological crisis. An increasing sub-division of land holdings also meant that the cultivated land was divided into a growing number of ever smaller plots.

Such intensive land use on a plain with so few trees caused great problems with drifting sand, as witnessed by the formation of inland sand dunes such as that known as Vittskövle Driva. In order to solve the problem, pine plantations were established in many places. Carl Linnaeus describes a plantation of this kind at Vittskövle during his journey through Skåne in 1749.

The state also encouraged a careful use of the land, with long periods of fallow as well as the "marling" of the soil. This involves excavating a special type of chalk-rich clay known as "marl" and spreading it over the fields. In the Kristianstad area marl pits in the fields are not as common as further south in Skåne, but one has been preserved at Näsby Fält.

***The landscape of the estates***
During the Middle Ages many estates were established on the plain, around which there were often extensive pastures for the raising of oxen. On the estates themselves deciduous forest was protected for the sake of hunting. During the eighteenth century a large number of castle parks and avenues were also established around these large estates.

**The age of enclosures (eighteenth and nineteenth century)**
During the eighteenth and nineteenth centuries the authorities endeavoured to increase agricultural productivity by instituting different enclosure reforms. The legislation for *storskifte* (the "great consolidation") came in 1757, *enskifte* ("single farm consolidation") in 1803 and *laga skifte* ("partial consolidation") in 1827. The aim of the consolidations was to bring together each farmer's lands into as few holdings as possible. As a result, great changes occurred in the landscape: villages were fragmented and many farms were moved out into the surrounding landscape, at the same time as the concepts of infield and outfield in principle disappeared. New patterns of settlement arose; farming became an individual undertaking, the landscape more linear, and the arable fields fewer in number but considerably greater in size. In Rinkaby today one finds a linear village of the pre-enclosure type, although it was established after the reforms, whilst Araslöv's farms are a typical example of the structure that was sought in the *enskifte*, with individual farms comprising compact blocks of land within an open cultivated landscape.

The eighteenth-century countryside in which almost three-quarters of the land had been used for pasture and hay meadows was changed dramatically by the enclosures. The villages' most productive fodder-producing areas were cultivated, whilst the rest of the land was given over to more intensive exploitation. In order to compensate for the shortfall of meadow land, measures were taken to establish water meadows such as those known as Borrestads Ängar.

**The rationalisation of agriculture**
The nineteenth century heralded tremendous changes in agriculture. One of the greatest of these was the introduction, from the mid 1800s onwards, of commercial fertiliser. This resulted in a radical reduction in the use of meadows, as fodder could now be grown on artificially fertilised pastures.

At many sites along the lower reaches of the River Helge å, however, the meadows used for haymaking that were flooded each year remained an important part of the total resources of the farms. Not only did they give relatively rich harvests with little input, but they were also difficult to manage in any other way as the area dried out later in the season.

During the twentieth century large expanses of wet grasslands were converted from hay meadows to grazing land. By the mid 1900s management had ceased in places and the wetlands started to become overgrown with reeds and willow osier, turning eventually into wet forest. From an area of approximately 3,000 hectares of hay meadows in the nineteenth century we now have 500 hectares of hay meadows and 1,100 hectares of pasture remaining in the wetland area. Despite the reduction, this is – in Swedish terms – a large area.

**Kristianstad – a food-producing area**
Branches of the agricultural industry continued to dominate the social economy up to the end of the nineteenth century. The food industry that today characterises the Kristianstad area developed largely at the end of the nineteenth century, when the emphasis shifted from subsistence farming to the production of raw materials. A large number of small industries such as dairies, slaughterhouses, sugar refineries, starch factories and distilleries sprang up. On the sandy soils of the plain a fair amount of tobacco was also grown, for example at Rinkaby. In step with twentieth-century rationalisations, many small agricultural businesses have subsequently closed or been bought up by larger companies. At Folkestorp, just south of the proposed biosphere reserve, there is today a Distillery Museum, depicting the old trade and demonstrating the great significance of the potato in the region.

Around the year 1900 extensive fruit orchards were established at Tomarp and Helmershus along the western shore of Lake Råbelövssjön, and these came to play a decisive role in commercial fruit growing in this part of Skåne. Within the biosphere reserve there are today some commercial orchards on the shores of Lake Råbelövssjön at Österlöv, whilst the majority of the region's commercial fruit growing now takes place around Lake Ivösjön and in the area of Österlen to the south.

**Claypits and quarrying affect the landscape**
The clay soils of Kristianstadsslätten Plain have also been used for brick-making. For a long time brick production was an ancillary craft to agriculture, but industrial brickworks began to spring up in conjunction with the enclosure reforms and the growth of the towns in the nineteenth century. Industrial clay-quarrying continued on the plain until the mid 1900s at places such as Önnestad, Håslöv, Hercules, Gärds Köpinge, Ugerup and Maltesholm.

Another industrial activity that is not linked to agriculture but has nonetheless had a marked effect on the landscape, is stone quarrying. More recently this has left lasting traces in the form of quarries and pits, but it also left its mark in earlier times, when it consumed a great deal of forest as fuel for fire-setting and limestone burning. Stone had been worked in Skåne from the Stone Age onwards, but with the advent of the Middle Ages quarrying began on a much larger scale. In the twentieth century stone-working included the production of road metal (macadam), monumental stones and industrial minerals. Within the proposed biosphere reserve chalk has been mined at Maltesholm, Balsvik and Balsberget, granite at Bjärlöv, diabase ("black granite") at Balsberget, sandstone on a small scale at Åhus, as well as large quantities of sand and gravel along stretches of glaciofluvial sediments on, for example, Helgeåsen Ridge at Nöbbelöv. Sand and gravel are still quarried on Rinkaby-Oppmannaåsen Ridge near Åhus, and road metal at Önnestad. There has also been some prospecting for kaolin clay for paper manufacture between Lake Råbelövssjön and Torsebro.

**Changes in the forests**
Through the ages the forests of the Kristianstad area have been subject to major changes, with the extensive areas of broad-leaved deciduous forest diminishing in size as the open pasturelands and cultivated landscape have expanded. When the land was divided into infields and outfields, the forests remained in the outfields. Initially these were not divided between the villages, but formed great commonages and could be exploited at will for private use. Population expansion implied an increasingly intensive use of the forests, however, which led to an almost complete deforestation in some areas. But not all the trees were common property. Up to the late eighteenth/early nineteenth century the fact that the state owned all

the rights to beech, oak and other suitable mast trees on crown lands and lands paying tax to the crown, meant that these trees could neither be felled nor damaged. They were essential for the construction of warships, and during the long years of warfare in the seventeenth century a considerable amount of forest was consumed. During the first half of the nineteenth century the abolition of crown rights to the trees in combination with the relocation of farms as part of the enclosure reforms led to the devastation of a great number of the remaining outfield forests and their replacement with grazing lands dotted with heather and juniper.

Apart from the planting of pines instigated to counteract the drifting sand on the plain, reforestation did not gain momentum until the second half of the nineteenth century, and then most often on the initiative of the great estates. However, with the Swedish silviculture legislation of 1903, which decreed reforestation, a more comprehensive task of restoration was begun. The areas of forest have since increased continuously and today the heights around Kristianstadsslätten Plain are dominated by forest. The forests have, however, changed character, as the old oak- and beech-clad slopes have in many places been planted with firs.

**Changes in the water system**
Despite long-term exploitation of the wetlands around the River Helge å, the water system itself remained relatively unaffected up to the seventeenth century, when some infilling was carried out in connection with the foundation of the town of Kristianstad, and canals were built at Hernestad and Åhus.

***The water level in the River Helge å is lowered in 1775***
One important change, which occurred very quickly and influenced the entire water system, took place in 1775. In 1774 the farmers of Yngsjö had dug a ditch from Lake Lilla Yngsjön through the sand dunes and out to the sea in order to counteract the river's annual flooding of their fields. In the spring flood of 1775 the River Helge å made a new outfall to the sea via this ditch, which meant that the river had a lower point of egress out into the sea and the whole water system was lowered by approximately 60 to 70 cm at Kristianstad. As a result relatively large areas were drained, much to the pleasure of those landowners who thus found themselves with a larger acreage of arable land, for example in the villages of Norra Åsum, Hovby, Rinkaby and Yngsjö, and on the Råbelöf estate. However, for landowners with sandy soils on higher ground, such as those in Hernestad, the reclamation meant that their fields became too dry, and the spring flood no longer reached the wet grasslands.

***Embankment of the Nosabyviken inlet in 1860***
During the nineteenth century there were plans to embank the River Helge å and drain Lake Hammarsjön together with the Nosabyviken inlet and Lake Araslövssjön. The project proved to be more difficult than anticipated, however, and was beset by financial problems. Only Nosabyviken was drained before the undertaking was abandoned.

***Further embankments and dredging***
During the twentieth century further wetlands were drained, for example by means of small embankments, where the prime aim was to gain arable land, as at Lillö and north of the Fredriksdalsviken inlet. Infilling to create new building land has also been carried out at Kristianstad, where, during the second half of the twentieth century, the wetlands of Harlövs Ängar were turned into a landfill area.

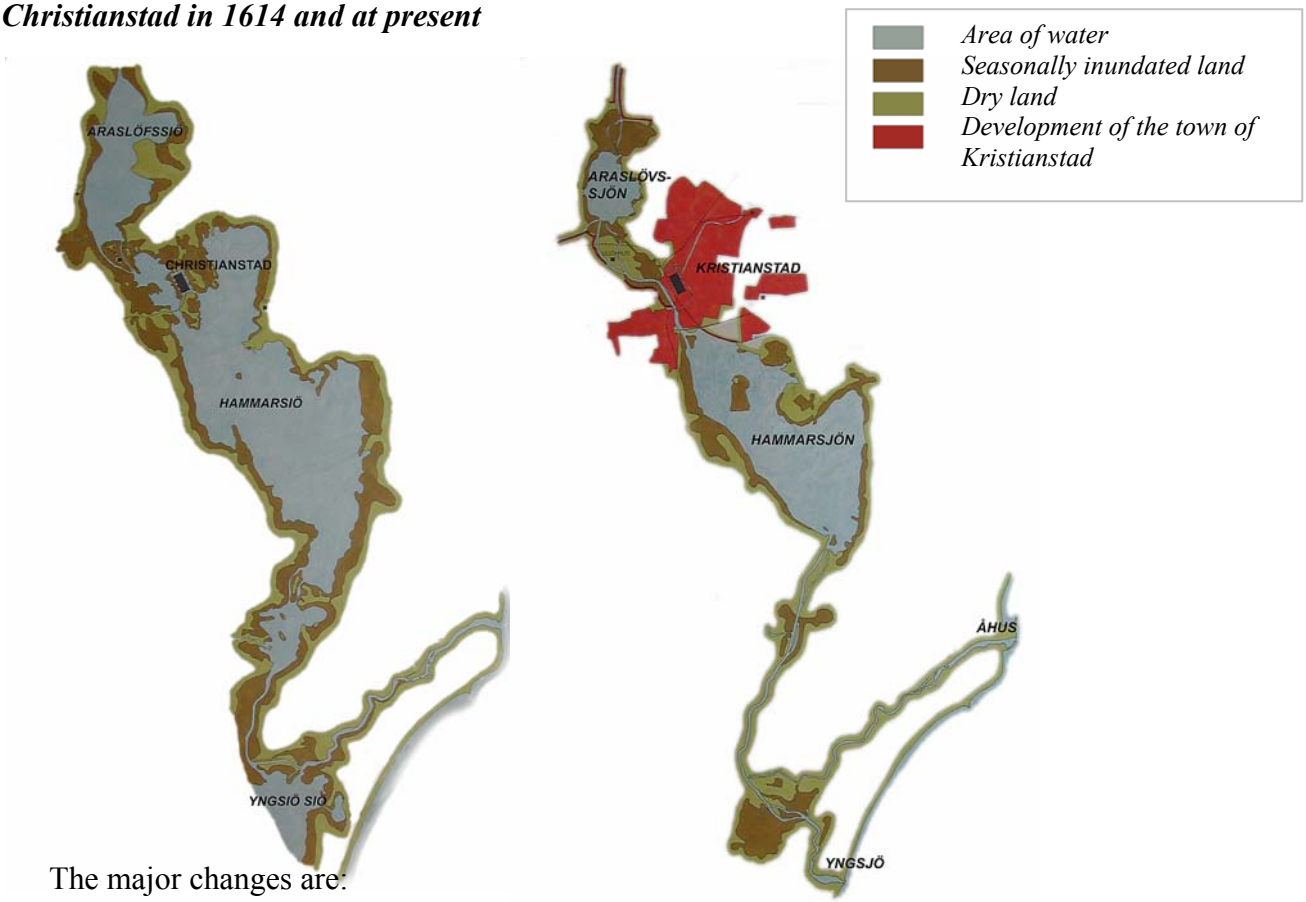
On the lower reaches of the River Helge å some dredging was carried out in the late 1930s to channel the water flow and achieve a more rapid run-off from the surrounding fields after the

spring high water level. To this end a sill in the water system was also removed, and piers were built out at the mouth of the river. The effect of this regulation work was that the average level of the river was lowered by a couple of decimetres.


***Map 2***
***Coast and land 6 000 years ago***

6 000 years ago, during the Neolithic Period, the River Helge å was a bay of the sea as far north as Torsebro.
***Map: National Atlas of Sweden***


***Map 3***
***The lower water system of the River Helge å around the time of the foundation of Christianstad in 1614 and at present***




The major changes are:
- The new outfall of the River Helge å into the sea at Yngsjö in 1775
- Drainage of the Nosabyviken inlet in the 1860s
- Further embankments primarily north of the town of Kristianstad in the twentieth century

***Maps: Sven-Erik Magnusson 1981***

## 10. HUMAN POPULATION OF PROPOSED BIOSPHERE RESERVE:

[Approximate number of people living within the proposed biosphere reserve]

permanently / seasonally

| | | |
|---|---|---|
| **10.1.** | **Core Area(s):** | 14/ ? |
| **10.2.** | **Buffer Zone(s):** | 1,959/ ? |
| **10.3.** | **Transition Area(s):** | 66,366 / ? |

### 10.4. Brief description of local communities living within or near the proposed Biosphere Reserve:

[Indicate ethnic origin and composition, minorities etc., their main economic activities (e.g. pastoralism) and the location of their main areas of concentration, with reference to a map if necessary]

The proposed biosphere reserve comprises the majority of the land area of the Municipality of Kristianstad and some parts of the sea area. The municipality has almost 75,000 residents. By Swedish standards, the area is densely populated with approximately 55 inhabitants/km$^2$, compared with a national average of 21.6 inhabitants/km$^2$. Slightly more than 8% of Kristianstad's residents were born outside Sweden; most of these now live in the principal town in the region, Kristianstad. Kristianstad was founded in 1614 by the Danish King Christian IV and has approximately 29,000 residents. Within the proposed biosphere reserve there are almost 40 population centres, ranging in size from small villages to larger population centres. Approximately half of the population centres have more than 200 inhabitants, which makes Kristianstad the Swedish municipality with the greatest number of population centres. Most of these are on Kristianstadsslätten Plain, while the forested areas to the north and south are rather less densely populated. In summer the population increases markedly, particularly along the coast, where there are approximately 1,700 summer homes.

The town of Kristianstad, situated at the heart of the biosphere reserve, is a centre for commerce, service, trade and industry in the area. Local industry is extremely varied, although the main focus is on foodstuffs and agriculture with ancillary industries. Together with public and civil administration, trade and services, this constitutes the main basis for employment in the area. In the town of Åhus, which lies at the northern outfall of the River Helge å into Hanöbukten Bay, and which was formerly a very important trading town, there is a relatively large harbour that is used primarily for cargo shipments.

### 10.5. Name(s) of nearest major town(s):

***Kristianstad***. The capital of the region, located in the centre of the biosphere reserve. Population: 28,800
***Malmö***. The county town of the county of Skåne, approximately 100 kilometres south-west of the proposed biosphere reserve. Population: approximately 265,000.
***Copenhagen.*** The capital of Denmark, approximately 130 kilometres south-west of the proposed biosphere reserve. Population: approximately 500,000.

### 10.6. Cultural significance:

[Briefly describe the proposed Biosphere Reserve's importance in terms of cultural values (religious, historical, political, social, ethnological)]

**Old centre of settlement**
In Scandinavian terms, Kristianstadsslätten Plain is an ancient centre of settlement, rich in ancient monuments, the oldest of which dates back to approximately 11,000 BC. Dolmens and passage graves from the Neolithic Period (4,200 BC to 1,800 BC) show differences in

power and social status in the community even at that time, and also reflect the then current belief systems. During prehistoric times (approximately 12,000 BC to 1,050 BC) religious beliefs and customs were also associated with the wetlands and water, into which various objects were placed as sacrificial offerings. Within the biosphere reserve several bog sacrifices have been discovered, particularly objects dating from the Neolithic Period to the early Iron Age (approximately 4,200 BC to 500 AD), for example in Lake Råbelövssjön and the now reclaimed Nosabyviken inlet, and in the peat bogs at Hovby and Viby.

**From Viking to Christian**

The trade conducted with the continent in prehistoric times increased markedly during the latter part of the Iron Age, the Viking Age (approximately 800 – 1000 AD), when trading centres and markets flourished. Gärds Köpinge, for example, became an important centre for trade and crafts. At Transval in the southern part of Åhus trade was being carried on as early as 800 AD with most of the known world, including the Mediterranean countries and the Orient. Active missionary work was also conducted at these trading centres. Around 1000 AD, at the same time as Skåne was incorporated into the kingdom of Denmark, a change in religion took place, from belief in the Norse gods to Christianity. At that time Skåne acquired its first Catholic bishop and the first wooden churches were built. During the twelfth and thirteenth centuries numerous stone churches were erected on Kristianstadsslätten Plain, many of which, such as those in Gärds Köpinge, Norra Åsum, Lyngsjö and Vä, still date from this period.

**Towns develop during the Middle Ages**

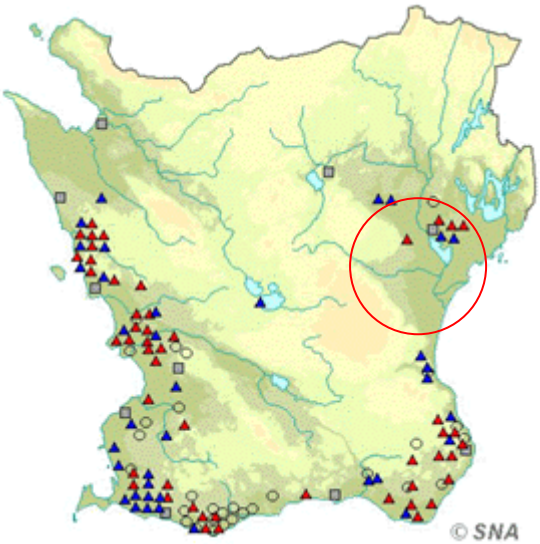
During the Middle Ages many farms and estates were donated to the Church, which became the largest landowner in Skåne. At the same time the power of the nobility increased and the extent of the noblemen's land holdings expanded. Large estates such as Råbelöf, Vittskövle, Ovesholm and Ugerup, as well as the ruin of Lillö Castle**,** all derive from this period. The Middle Ages (1000 to 1536 AD) were also the age of urbanisation, when towns based on livelihoods other than agriculture began to develop. These towns became administrative, religious and commercial centres, where trade and crafts dominated. Vä, one of the oldest towns in the biosphere reserve, was granted its charter in the mid 1200s. Åhus also gained its town charter during the same century. Åhus is first mentioned in written sources in the year 1149, when the area was granted to the Archbishop in Lund, and during the Middle Ages *Mariakyrkan* ("The Maria Church") was built as well as *Aose Hus* Castle and the town wall. There was also a Dominican monastery, a leper hospital and a *helgeandshus* (a "House of the Holy Spirit", a charitable institution, part hospital, part poor house and hostel for travellers).

However, Åhus began to decline from the time of the Reformation in 1536, when the Danish king pronounced himself head of the church and severed links with the papal see and the Catholicism. Although sea trade continued to play a certain role, in 1617, shortly after the founding of Kristianstad, Åhus's town charter was revoked. In a parallel development, the town of Vä also lost its town charter in connection with the founding of Kristianstad.

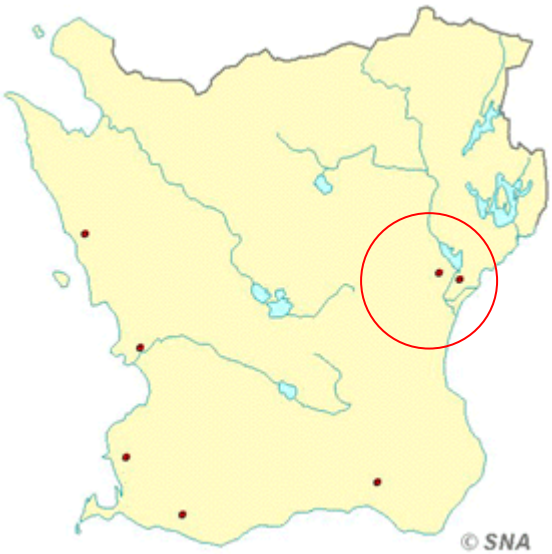
**The founding of Kristianstad**

The town of Kristianstad was founded in 1614 by the Danish King Christian IV. The surrounding area was then a troubled frontier between the kingdoms of Denmark and Sweden, and in 1612, after the Swedes had attacked and burned the trading town of Vä, King Christian resolved to establish a new, strongly fortified town on the inaccessible island of Allö in the marshes of the River Helge å. However, at the Peace of Roskilde in 1658 Skåne became Swedish, and Kristianstad lost its importance as a frontier fortress. Nevertheless the town did

become the county town for Kristianstad County up to the amalgamation with Malmöhus County in 1997, and certain aspects of Skåne's public administration are still run from Kristianstad. The town plan, with its regular network of streets and rectilinear division into city blocks, was a totally new concept in Scandinavia in 1614. This original plan still remains and may be clearly seen in the present town centre. *Trefaldighetskyrkan* ("The Church of the Holy Trinity"), constructed between 1617 and 1628, has been called the most beautiful Renaissance temple in Scandinavia.

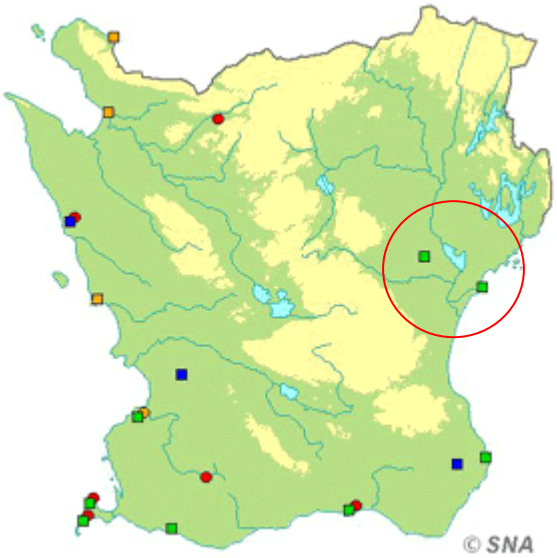



***Map 4***
***Stone Age burials***
***Map: National Atlas of Sweden***




***Map 5***
***Permanent Viking Age markets***

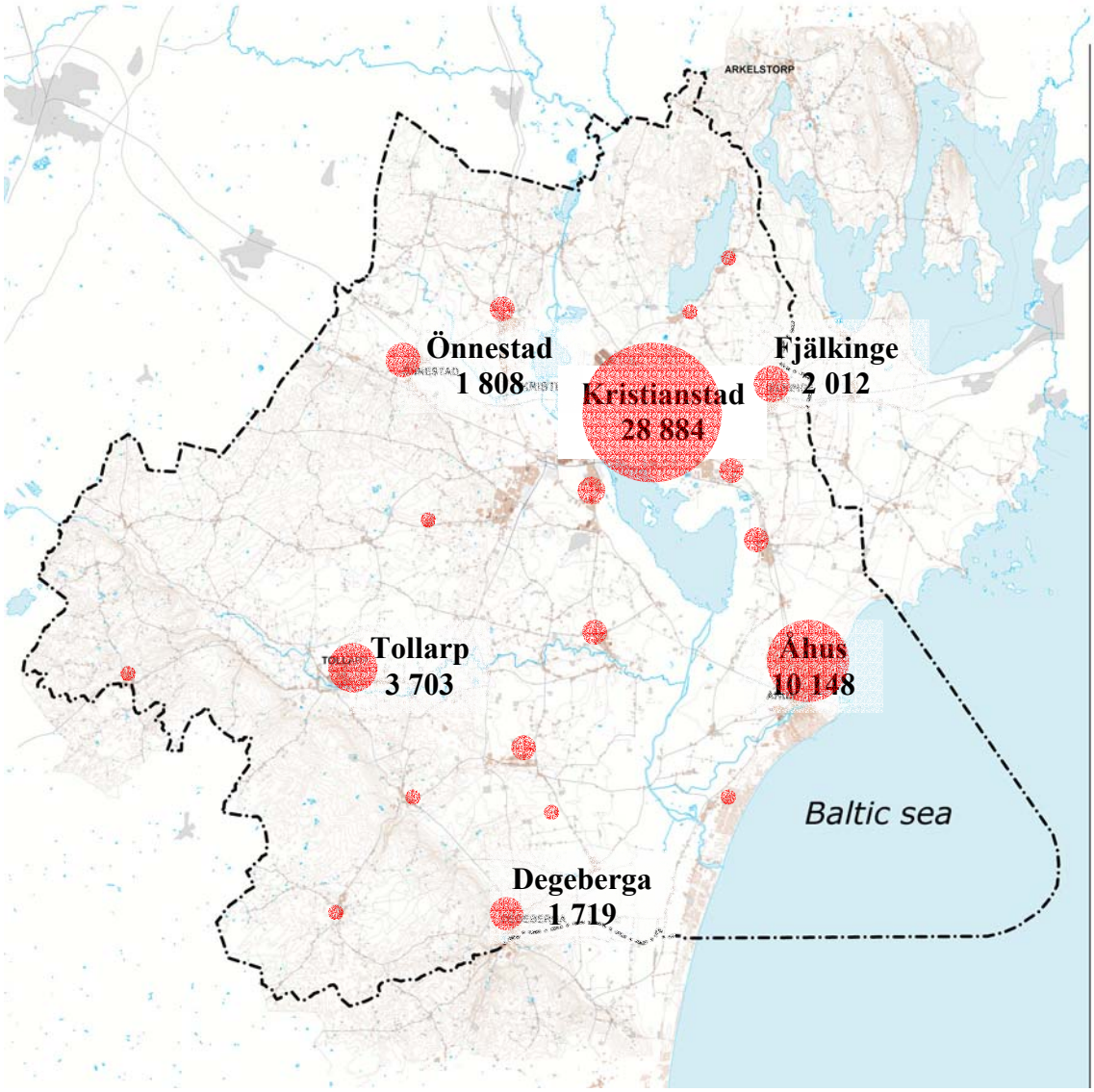
Two of the most important market sites within the proposed biosphere reserve are the market at Åhus (Transval), which was once one of the largest in Scandinavia, and a Viking market site at Gärds Köpinge.
***Map: National Atlas of Sweden***




***Map 6***
***Medieval towns in Skåne***

The medieval towns of Vä and Åhus are indicated within the proposed biosphere reserve.
***Map: National Atlas of Sweden***

***Map 7***
***Population in the larger communities within the proposed biosphere reserve.***
Figures correct as per 31 December 2003 according to www.kristianstad.se



## 11. PHYSICAL CHARACTERISTICS

### 11.1. General description of site characteristics and topography of area:

[Briefly describe the major topographic features (wetlands, marshes, mountain ranges, dunes etc.) which most typically characterize the landscape of the area.]

The central part of the proposed biosphere reserve consists of the low-lying, level Kristianstadsslätten Plain, which is crossed by the lower course of the River Helge å with its tributaries, Vramsån, Mjöån and Vinne å. The plain includes the entire range of biotopes from wetlands to dry land. Around the shallow lakes Araslövssjön and Hammarsjön, just as around those lakes which have become choked with vegetation, such as Ripa sjö and Yngsjösjön, there are extensive wetlands, whilst the driest ground consists of level sandy areas, with some inland sand dunes, and – as you approach the seashore – extensive coastal dunes. The area of the plain is limited to the south-west and south by the rectilinear horst formations of the ridges of Nävlingeåsen and Linderödsåsen, parts of which are included in the biosphere reserve. To the north the level plain is transformed here and there into a more undulating landscape of inselbergs: in the east the smoothly rounded coastline meets the Hanöbukten Bay area of the Baltic Sea. The seabed in Hanöbukten differs markedly north and south of Åhus, with topographically irregular morainic beds in the north and level transport beds in the south.

### 11.2.1. Highest elevation above sea level:

Approximately 190 metres a.s.l. (on Linderödsåsen Ridge west of Östra Sönnarslöv).

### 11.2.2. Lowest elevation above sea level:

On land 2.41 metres below sea level. (This is Sweden's lowest point on land, which is below sea level in the embanked Nosabyviken inlet.)

The bottom of Lake Råbelövssjön is approximately 9 metres below sea level. (The lake is 11 metres deep.)

### 11.2.3. For coastal/marine areas, maximum depth below mean sea level:

19 metres.

### 11.3. Climate:

[Briefly describe the climate of the area using one of the common climate classifications]

The area has a warm temperate climate, according to Köppen's climate classification.

### 11.3.1. Average temperature of the warmest month:

+16.6ºC.

### 11.3.2. Average temperature of the coldest month:

–0.9ºC.

### 11.3.3 Mean annual precipitation:

562 mm, measured 10 metres a.s.l.

### 11.3.4. If a meteorological station is in or near the proposed Biosphere Reserve, indicate the year since when climatic data have been recorded:

Within the biosphere reserve the Swedish Meteorological and Hydrological Institute (SMHI) has a climate station and Kristianstads Vattenrike has a weather station.

**a) manual:**

SMHI since 1878.

**b) automatic:**
Kristianstads Vattenrike since 1997. Meteorological data are presented on the Internet at www.weather.vattenriket.kristianstad.se and are updated every 30 minutes.

**c) station's name and location:**
SMHI Kristianstad, 56°00' N, 14°09' E.

Weather on-line in Kristianstads Vattenrike, 56°02'05'' N, 14°09'11'' E.

### 11.4. Geology, geomorphology, soils:
[Briefly describe important formations and conditions, including bedrock geology, sediment deposits, and important soil types]

The proposed biosphere reserve is composed of a geomorphologically varied landscape, which in its central parts consists of the long, level Kristianstadsslätten Plain, underlain by sedimentary rocks of the Cretaceous Period. In the north the level plain is interrupted along an undulating line of erosion by the rolling inselbergs of north-eastern Skåne that consist of Archean rocks. To the south and south-west rise the rectilinear primary horsts of the ridges of Linderödsåsen and Nävlingeåsen, with clear fault scarps above the plain. To the east the plain's sandy landscape of coastal dunes borders the coastal waters of Hanöbukten Bay in a long arc. The biosphere reserve is part of the Swedish natural geographic region known as "Skåne's sediment and horst areas".

**Pre-Cambrian**
The oldest rocks of the biosphere reserve consist of Archean rocks from the group of South-West Swedish gneiss, primarily comprised of metamorphosed volcanic deposits and granitoids, formed approximately 1,650 million years ago. The younger granites of the area lie as distinct massifs and were formed approximately 1,450–1,350 million years ago, after the mountain chain formation that caused the metamorphosis of large parts of the older bedrocks. Approximately 1,180 million and 930 million years ago respectively, basic magma forced its way up to the Earth's surface along long faults in the Protogine Zone, a tectonic zone that divides southern Sweden's rocks into a western and an eastern section. Along the Protogine Zone run north-south oriented dykes of hyperite diabase, of which some are metamorphosed amphibolite as well as syenitic rocks.

**Cambrian to Tertiary (545 million to 2 million years ago)**
The oldest phanerozoic rocks within the biosphere reserve consist of the approximately 294 million year old permo-carboniferous North West diabases. They are to be found as extensive dykes in the bedrock along the Tornquist zone, a zone of weakness in the Earth's crust which runs north-west to south-east through Skåne, and which was formed during a volcanically very active period.

***Blocks of Archean rock are raised and lowered***
Skåne's horst formations are also linked to movements in the Tornquist zone. During the later Triassic Period, the block carrying Linderödsåsen Ridge and the areas north of this began to rise, at the same time as the Earth's crust in the south dropped. During the late Cretaceous Period, approximately 70 million years ago, tensions in the Earth's crust led to the creation of the clearly marked fault zone of Linderödsåsen Ridge. The Kristianstad area began to sink, while the ridges of Linderödsåsen and Nävlingeåsen continued to rise. It was then that the present-day horst formations were created. Today the upper surface of the Archean rock within the land areas of the biosphere reserve is to be found at a maximum depth of more than 350 metres below sea level in the south-eastern area of Kristianstadsslätten Plain and at a

maximum height of 190 metres above sea level on Linderödsåsen Ridge. Skåne's horst formations also meant that older watercourses that had previously had their outfalls towards the south were redirected: the course of the River Helge å, for example, was instead diverted towards the east.

***Weathering shapes the landscape: inselbergs, corestones and potholes are formed***

Landforms and deposits in the landscape of chalk and inselbergs of north-eastern Skåne bear witness to a different climate from that of today and the location of the area at considerably more southerly latitudes. During the Triassic, for example (245–210 million years ago), southern Sweden lay at a latitude of 25°–35° north, compared with today's N 56°. During the Permian (290–245 million years ago) and a large part of the Triassic, the climate was hot and dry, but at the very end of the Triassic precipitation increased and the climate became tropically humid. This hot, humid climate prevailed for most of the Mesozoic (245–65 million years ago). The primeval rock was subjected to powerful deep erosion. The original minerals metamorphosed into boulder clay, which in the long term led to kaolin formation. After the erosion of the surface weathering cover, harder areas of the bedrock with fewer fractures remained as inselbergs in the landscape, and corestones that were more resistant to weathering rested in kaolin deposits on the bedrock. Weathering pits, exhibiting features such as rough weathering surfaces, potholes and channels were formed, presumably on exposed Archean rock surfaces during the Cretaceous.

***The Cretaceous Sea covers the landscape; the products of weathering are rearranged and chalk etc. is deposited.***

During the late Cretaceous (100–65 million years ago) the Mesozoic deep weathering was concluded in connection with the Cretaceous transgression. The sea then rose to cover the Kristianstad area on at least four occasions. These changing conditions brought about an extensive rearrangement of the products of older weathering and the deposition of various kinds of sediment, primarily clay, quartz sand and shell sand. In the lower layers of the compressed sediments, sand containing glauconite ("green sand"), is generally present, which provides the conditions for the plentiful groundwater reserves of Kristianstadsslätten Plain, Sweden's largest groundwater reservoir. Over time the sedimentary deposits in the area were built up into thick strata. At Balsberget Hill in the north there are today major local Cretaceous deposits at between 40 and 60 metres a.s.l. Outside the biosphere reserve Cretaceous sediment remains have been found at up to 120 metres a.s.l. In the Cretaceous deposits at Balsberget there is one of Skåne's largest cave systems: the known extent of Balsbergsgrottan ("the Balsberg Cave") is almost 290 metres, but there is presumably even more waiting to be discovered, for the cave-forming processes continue unabated. The Cretaceous sediments overlaid and conserved the more ancient weathering relief with its different weathering formations and remains.

***Weathering dissects out the ancient Archean rock forms beneath the chalk and creates the plain***

During the Tertiary (65–2 million years ago) southern Sweden once again became a land area; the thick layers of more easily weathered Cretaceous rocks began to erode away, and parts of the Archean rock relief, deeply weathered in the Mesozoic with cores of resistant inselbergs began to be dissected out again. Old weathering forms on the surface of the Archean rock, such as potholes that had been covered by chalk, began to dissect out again. These weathering forms can be studied at different places in the area, for example at Hallabacken near Färlöv. Today's relatively flat rock surface on Kristianstadsslätten Plain, consisting of chalk deposits, can be regarded as a Tertiary weathered peneplain. The Cretaceous deposits of the plain are

still more than 300 metres thick down to the south-east, but their thickness generally diminishes towards the north and west. Depressions in the Cretaceous deposits occur, for example north of Fjälkinge Backe Hill, where the Cretaceous bedrock has been totally eroded in places. North of Tollarp a long narrow erosion valley from the Tertiary or Quaternary Period has also cut its way right down to the Archean rock, approximately 20–30 metres deeper than the surrounding chalk-dominated rock top-surface. During the Tertiary a watercourse presumably cut its way deep down into the chalk bedrock under the area where the River Vramsån today runs. Rocks of Tertiary age in compact clefts are, however, not known from the Kristianstad area, but are assumed to be found above the Cretaceous deposits out in Hanöbukten Bay.

## Quaternary (2 million years to the present day)

### *Till dominates the land in upland terrain*

During the Quaternary, southern Sweden was covered by ice sheets on a number of occasions. The polishing and plucking processes of the ice sheets continued to erode older weathering soils and bedrock materials. The eroded material was deposited as an unsorted till, normally directly onto the bedrock. Within the biosphere reserve till is found as a surface soil, primarily on or close to the heights, but it also commonly underlies other soils in the area. In areas of Archean rock the thickness of this till varies between 0.5 and 10 metres, whilst it is often between 10 and 20 metres, and locally up to 75 metres thick on Kristianstadsslätten Plain. The surface of the till often follows the contours of the underlying bedrock, but on the ridges of Linderödsåsen and Nävlingeåsen there are also areas with hummocky morainic and drumlinoid morainic forms. In the Archean rock terrain there are also drumlins and drumlinoid forms with lee-side formations, and with bigger formations around the inselbergs, for example by the hills of Fjälkinge Backe and Balsberget.

### *The ice sheet melts and water covers the Kristianstad area*

The most recent ice sheet began to melt from the southern area of the biosphere reserve about 13,000 BC. Around 12,850 BC the ice margin remained at the southern outfall of Lake Hammarsjön, and 200 years later it had retreated from the biosphere reserve completely. On Kristianstadsslätten Plain the rate of ice melt was about 75 metres per year. During the melt the plain was under water, and the highest shoreline was gradually formed in the Baltic Ice Sea approximately 50–55 metres a.s.l. At that time the greater part of the biosphere reserve was under water. To the north the inselbergs stood out like islands in an archipelago, whilst the horsts in the south formed contiguous landmasses.

### *Glacial rivers deposit coarse-grained material to form heights in the landscape*

During the glacial melt, glaciofluvial sediment was deposited successively just within and beyond the ice margin. Gradually, as the ice retreated, large expanses of such glaciofluvial sediment were formed parallel to the most recent direction (generally north-south) of ice movement on Kristianstadsslätten Plain, for example the ridges or outwash fans of Rinkaby-Oppmannaåsen and Helgeåsen, the smaller ridges Råbelövsåsen, Balsbyåsen and the glaciofluvial sediment at Norra Åsum. Along the north-eastern slope of Linderödsåsen Ridge there are also several glaciofluvial sediments, for example the great ridge or esker of Hörrödsåsen, which also continue as an extensive field with undulating morphology and some hummocky forms down on the plain around Degeberga. Glacial rivers also helped deepen and expand ravines in older fault zones with crushed Archean rock on the horsts, for example, the

ravine at Forsakar (*Forsakarsravinen*) and the course of the River Mjöån down the north-eastern slope of Linderödsåsen Ridge.

***Fine-grained material from the melt-water rivers is deposited in extensive thick layers of clay***

In calmer waters off the mouths of the glacial rivers, fine-grained glacial sediments were deposited in the form of silt and clay. The sediment, dominated by clay, has its greatest extent from 0 to 15 metres a.s.l. and generally reaches a maximum of 35 metres a.s.l. As a surface soil, clay occurs primarily in the area around Kristianstad and towards the north-west, but it commonly underlies fluvial outwash, fine-grained lake sediments and organogenic deposits on Kristianstadsslätten Plain. The glacial clay is predominantly varved, with clear boundaries between summer and winter layers. Thicknesses vary between 1 and 25 metres, with the thickest layers around Kristianstad and along the coast.

***The waves wash out and sort the ice sheet deposits***

The outwash of soils formed earlier, primarily till and glacial river sediment, was intensive in the Baltic Ice Sea. Rubble, gravel, sand and coarse mo-clay were deposited from the highest shoreline and downwards. Today these highest shorelines can be seen in the terrain at Balsberget and Fjälkinge Backe as well as on the steep cliffs of Nävlingeåsen near Skepparslöv. On Kristianstadsslätten Plain the fluvial outwash sediment is primarily made up of a very well sorted sand, with thicknesses of between about 1 and 8 metres. Locally the thicknesses can be greater, for example, on the leeward-side of the glacial river deposits. Along the coast, south of Åhus, the fluvial outwash is 15–20 metres thick. The fluvial outwash sediment on the lower parts of the plain derives, however, from later rises in water level and is in some cases built on wind-deposited sand.

***The shorelines move from high up on the ridges to far out into Hanöbukten Bay***

The lake and sea stages which preceded the present Baltic Sea have flooded Kristianstadsslätten Plain a number of times since the ice sheet melted around 13,000 BC. Periodically parts of Hanöbukten Bay have been dry land.

After the ice sheet melted, uplift and the draining of the *Baltic Ice Sea* produced a relatively rapid reduction in water levels from approximately 50–55 metres to just a few metres above the current sea level. Then only one long inlet remained on what is now Kristianstadsslätten Plain.

The shoreline continued to drop, reaching its lowest level – probably at least 30 metres below the current sea level – during the *Yoldia Sea* phase (approximately 9,600 BC to 8,850 BC). In Hanöbukten Bay a large number of pine stumps have been found down to depths of 30–40 metres: many of these, at depths of between 13 and 17 metres, are still rooted. There are also widespread peat deposits at depths of down to 28 metres below current sea level.

During the phase of the *Ancylus Sea* (8,850 BC to 7,550 BC) the water again rose rapidly and within a few hundred years the pine forests of Hanöbukten Bay had been totally submerged. At the culmination of the Ancylus transgression (approximately 8,250 BC) the shore line lay somewhat higher than today's, only to drop once again.

During the initial phase of the subsequent Baltic Sea stage, the shoreline of the *Littorina Sea* (7,550 BC to 3,750 BC) lay some 10 metres below current sea level. Where Lake Hammarsjön now lies, alder forest grew, and rooted stumps in the lake have been given a carbon-14 dating of approximately 7,500 years (correlated age dates them to within a few years of 6,367 BC). At that time the River Helge å flowed where the lake is now at its deepest. The Littorina Sea then rose once more to cover Kristianstadsslätten Plain and at its culmination (4,350 BC to 3,850 BC) reached its highest postglacial level some 5 to 8 metres

above current sea level. The sea then reached more than 35 km inland from today's coastline; Lake Råbelövssjön was a bay of the sea, and the River Helge å had its outfall into the sea around Torsebro.
As a result of the inundation of land during the Littorina Period, soils formed previously were washed out and new shorelines were formed. In the Kristianstad area there is no evidence of any reworking of glacial till with resulting fields of cobbles connected to the Littorina Sea.

***From a line of sand bars to one long sandy beach***
In the inner sections of Hanöbukten Bay, northward flowing sea currents brought sand which added incrementally to the sand bars to the north. This, in combination with another fall in sea level, meant that the mouth of the sea inlet in towards Kristianstadsslätten Plain became narrower. From Olseröd, just south of the biosphere reserve, the sand bars came to follow a gentle arc right across the mouth of the inlet up towards a tongue of moraine near the present town of Åhus.
The moraine protruded as an exposed underwater spit into the sea at that point, which meant that the sand could not be deposited, but was transported away again by the sea currents. Because of the build-up of the sand bars, the outfall of the river into the sea was displaced northwards. Traces of earlier vegetation have been found beneath the sand bars at Yngsjö and elsewhere, where earlier peat deposits have been covered by several metres of sand.
When a sand bar broke the surface of the sea, the wind continued to build up the height of the bar, forming dunes. As the sea level dropped, the barrier became higher, and gradually the lagoon that had been formed within the sand bars lost all contact with the sea. The southern part of the lagoon began to choke with vegetation and gradually turned into fenland, which is reflected in the extensive fens currently found from Yngsjö down towards Olseröd.
The course of the River Helge å across Kristianstadsslätten Plain progressed through what were at the time long narrow lakes and wider sections of river out towards the lagoon area, and then made its way north to the present-day Åhus, where the outfall into the sea had not sanded up. As the sea level continued to drop towards its present-day levels, the northern outfall became shallower and the river had to dig deeper into the substratum. Where the flow cut down into the larger blocks of till, small sections of rapids were formed, for example at Gamle Ström just west of Åhus. Until the 1770s the River Helge å had its only outfall into the sea at Åhus, but in 1775 the river forged a new outfall into the sea via a drainage ditch, which the farmers of Yngsjö had dug right through the sand bar at Lilla Yngsjön in 1774. The river gained a lower outfall point out into to the sea, and the whole of the water system of the lower River Helge å dropped by 60-70 cm at Kristianstad, which affected the entire low-lying water system.

***Wind and sea currents continue to move the sand***
After the retreat of the Littorina Sea, the sand deposits of the area have continued to be rearranged by the force of the water in Hanöbukten Bay and by the effect of the wind ashore. Today, in a belt 500 to 1,000 metres wide there is one of Sweden's most extensive landscapes of coastal dunes. On the seaward side there is a sand-dominated beach of relatively constant width. The form of the coastline and the character of the beach indicate that, at present, there is a relatively stable balance between erosion and accumulation in Hanöbukten Bay. On Kristianstadsslätten Plain great inland dunes have been formed by sand piling up against obstacles in the landscape during historical times, as is the case with, for example Vittskövle Driva and the dunes at Eskilstorp, Åkeslund and Gringelstad. The main direction of dune formation is NNE and in the majority of cases the dunes are located along property boundaries. Sand dunes are very sensitive to erosion, and the biosphere reserve's coastal

dunes have today been planted with pines in order to inhibit the movement of sand, while the inland dunes are usually covered in dry grass and lichen vegetation with scattered pines.

**The strata sequence of soils in the area**

The present-day strata sequence of soils on Kristianstadsslätten Plain is usually from the bottom up: till, glaciofluvial sediment, glacial clay and/or ice-lake sand, outwash sediment and sometimes wind-borne sediment at the top. The thicknesses are normally 10 to 20 cm. The surface soils are dominated by sand, with some glacial river sediments, till and clay. Around the low-lying watercourses there are also widespread areas of mud (known as "gyttja") and fluvial deposits. These are partly the result of recent ditching and embanking, but large areas are still influenced by the seasonal changes in water level in the lower course of the River Helge å. Large areas of fenland are also to be found on the plain. The areas of Archean rock are characterised by moraines with a number of smaller fens and some bogs.

**Groundwater**

The sedimentary bedrock of Kristianstadsslätten Plain contains Sweden's largest groundwater reservoir, which is one of the most extensive in all of northern Europe. Large parts of this lie within the proposed biosphere reserve. The groundwater is recovered primarily in the glauconite sand, which locally has thicknesses of over 70 metres in the lower levels of the sedimentary deposits at a depth of 50 to 250 metres. There is also a lot of groundwater in the chalk bedrock above the glauconite sand and in glaciofluvial sediment. Finally there are many small groundwater reservoirs in the surface layers that consist of till, sand and clays.

The groundwater has a complex pattern of movement within the plain, but broadly the movements occur from inflow areas, via the soil layers and the sedimentary bedrock, to outflow areas, where the water flows out into wetlands, watercourses, lakes and the sea.

The dominant inflow areas for the great groundwater reservoirs are mostly located at the periphery of the plain, primarily along the northern slopes of the ridges of Linderödsåsen and Nävlingeåsen, as well as in the stretches of glaciofluvial sediment running in a north-south direction across the plain. The outflow areas are primarily located within the central and south-eastern parts, for example, around Önnestad, Lake Araslövssjön, Lake Hammarsjön and the lower course of the River Helge å, as well as along the coast from Yngsjö in the south to Bromölla, north-east of the proposed biosphere reserve.

The great outflows of groundwater that occur on Kristianstadsslätten Plain influence the character of the watercourses. They maintain a more even temperature over the year and, after its passage through the chalk-rich sedimentary rocks, the groundwater is usually hard, has a high pH value and a low nutrient content – factors that combine to produce a positive effect on the quality of the surface water.

The composition of bedrock and soils leaves its mark on the groundwater that flows out into fens and minor watercourses. Within the areas of Archean rock in the south-west and north poor fens have developed, and here some watercourses are also sensitive to acidification: the fens of the plain, however are marked by high chalk content, and a few rich fens have escaped drainage and cultivation.

The groundwater reserves of Kristianstadsslätten Plain are a very valuable resource. Within the plain there are today an estimated 3,000 to 4,000 drilled wells, the majority of which take water from the glauconite sand or the other sedimentary rocks. In the glaciofluvial sediment and other strata on the plain there are fewer drilled wells, but approximately 5,000 dug wells and wellpoints. A total of 23 municipal waterworks and water abstraction plants are spread across the municipality. The deep-drilled wells of Kristianstad itself are today located within or adjacent to the urban area. The groundwater of the plain, which is generally of high drinking water quality, is used for municipal water supplies and for irrigation, animal

husbandry, heating and cooling, and other industrial and domestic applications. The Malmberg Water Company in Yngsjö uses the high quality groundwater for its *Malmbergs Original* mineral water.
There are also great abstractions of groundwater in connection with reclamation and mine drainage of chalk quarries.
Exactly how much groundwater may be abstracted from the sedimentary rocks of Kristianstadsslätten Plain without negative consequences has not yet been determined. Large-scale exploitation from the sedimentary rock lowers the groundwater levels at the same time as it increases leakage from the strata into the bedrock. This can, for example, lead to a reduction in groundwater reserves in the surface strata and reduce groundwater run off from the strata into watercourses and wetlands.
Large abstractions in places near to the coast raise the prospect of salt-water contamination, whilst in areas in which farming is intensive, surface groundwater with a high nitrate content can be carried more quickly towards deeper groundwater. Large abstractions from wells in outflow areas can lead to these areas becoming inflow areas instead – with an increased risk of contamination. This is the case in the municipal wells in Kristianstad.
A whole host of different human activities in the short or longer term affect the quality of the groundwater: examples include diffuse nitrogen leakage from agricultural land, airborne deposition of nitrogen and sulphur, the use and spread of pesticides, leach-water from waste dumps and landfills, diffuse leakage from urban and industrial areas and discharges from roads, private wastewater tanks, cess pits and manure plants.
A variety of different alternatives are being discussed within the Municipality of Kristianstad for future water provision. One, for example, investigates the consequences of establishing new well areas in different locations. In this work a highly sophisticated geo-hydrological computer model is being employed, which deals with questions of both the flow and quality of surface water and groundwater on Kristianstadsslätten Plain.


***Map 8***
***Landforms***
***Map: National Atlas of Sweden***

*Plain, morainic hills*
*Horsts, rift valleys*
*Archean rock terrain with horsts*
*Plain*
*Hills of Archean rocks formed during the Cretaceous Period*
*South Småland plain formed from Archean rocks*


***Map 9***
***Skåne: solid geology***
***Map: National Atlas of Sweden***

Hyperite diabase
The Karlshamn granite group. Vånga granite
Syenite, monzonite
Charnockite
Orthogneiss, light or reddish
Gneiss granite, grey or red-grey
Gabbro, diorite, amphibolite
Acidic volcanic rocks
Quartzite, micaceous schist
Sedimentary rocks
Glauconite sandstone and marl stone (early Tertiary)
Chalk (earliest Tertiary)
Chalk, sandstone and claystone
Clay, arenaceous shale (late Triassic-Jurassic)
Sandstone etc. (Kågeröd Formation: late Triassic)
Sandstone, chalk (Silurian)
Arenaceous shale (Silurian)
Arenaceous shale (partly alum shale, Cambrian and Ordovician)
Sandstone, Cambrian


***Map 10***
***Skåne: groundwater resources***
***Map: National Atlas of Sweden***

*Sand and gravel deposits*
*>1,500 litres/min.*
*300-1,500 litres/min.*
*60-300 litres/min.*
*12-60 litres/min.*
*Sedimentary rocks*
*>1,000 litres/min.*
*300-1,000 litres/min.*
*100-300 litres/min.*
*30-100 litres/min.*
*10-30 litres/min.*
*<10 litres/min.*
*Archean rocks*
*>100 litres/min.*
*30-100 litres/min.*
*10-30 litres/min.*
*<10 litres/min.*

## 12. BIOLOGICAL CHARACTERISTICS

[List main habitat types (e.g. tropical evergreen forest, savanna woodland, alpine tundra, coral reef, kelp beds) and land cover types (e.g. residential areas, agricultural land, pastoral land). For each type circle REGIONAL if the habitat or land cover type is widely distributed within the biogeographical region within which the proposed Biosphere Reserve is located to assess the habitat's or land over type's representativeness. Circle LOCAL if the habitat is of limited distribution within the proposed Biosphere Reserve to assess the habitat's or land cover type's uniqueness. For each habitat or land cover type, list characteristic species and describe important natural processes (e.g. tides, sedimentation, glacial retreat, natural fire) or human impacts (e.g. grazing, selective cutting, agricultural practices) affecting the system. As appropriate, refer to the vegetation or land cover map provided as supporting documentation.]

The proposed biosphere reserve contains a wide spectrum of habitat and land cover types, ranging from more or less pristine ecosystems to land heavily modified by human activities. A selection of the most important habitat types is described in this chapter. It includes:

- Lakes and running water
- Grazing pasture and hay meadows
- Forests
- Coastal ecosystems
- Marine ecosystems
- Arable land
- Built-up areas

### DISTRIBUTION

### 12.1. First type of habitat/land cover: Lakes and running water

The proposed biosphere reserve contains a great variety of aquatic habitats.
The slow-flowing River Helge å crosses Kristianstadsslätten Plain, passing through Lake Araslövssjön and Lake Hammarsjön before flowing into the sea in Hanöbukten Bay. The watercourses originating on Linderödsåsen Ridge are of a very different character, beginning as fast flowing, upland streams, before becoming slow flowing lowland streams when they reach Kristianstadsslätten Plain and flow across this plain to their confluences with the River Helge å.

| *Ecosystem* | *Description* |
|---|---|
| *Running water* (Regional/Local) | The River Helge å is the biosphere reserve's main watercourse. From Torsebro in the north, it flows slowly across Kristianstadsslätten Plain before reaching the sea at Hanöbukten Bay.<br>A number of rivers and streams, both large and small, flow into the river along its length. These include the River Vinne å and those rivers, including the Vramsån and Mjöån, that originate on Linderödsåsen Ridge. |
| *Lakes* (Regional/Local) | The River Helge å broadens into two large, shallow lakes on Kristianstadsslätten Plain: Lake Araslövssjön and Lake Hammarsjön.<br>At Balsberget Hill in the north of the area lies Lake Råbelövssjön, a deeper expanse of water fed largely by groundwater. The biosphere reserve also contains a number of smaller lakes, the largest of which are Lake Gummastorpasjön and Lake Lyngsjön. Large reedbeds occur on the margins of the shallow lakes on the plain and are also found to a lesser extent around Lake Råbelövssjön, Lake Gummastorpasjön and Lake Lyngsjön. |

### 12.1.1. Characteristic species:

| *Group* | *Scientific name* | *Common English name** |
|---|---|---|
| Vascular plants | *Alnus glutinósa* | Alder |
| | *Najas flexilis* | Slender Naiad |
| | *Nymphaea alba* | White Water-lily |
| | *Persicaria amphibia* | Amphibious Bistort |
| | *Phragmites australis* | Common Reed |
| | *Potamogeton* spp | Pondweeds |
| | *Ranunculus fluitans* | River Water-crowfoot |
| | *Salix sp.* | Willows |
| | *Schoenoplectus lacustris* | Common Club-rush |
| Green algae | *Characeae* | Stonewort |
| Mosses | *Fontinalis antipyrética* | Water Moss |
| Mammals | *Neomys fodiens* | Water Shrew |
| | *Myotis daubentoni* | Daubenton's Bat |
| | *Mustela vison* | American Mink |
| Birds | *Acrocephalus schoenobaenus* | Sedge Warbler |
| | *Acrocephalus scirpaceus* | European Reed Warbler |
| | *Alcedo atthis* | Common Kingfisher |
| | *Anas platyrhynchos* | Mallard |
| | *Anser anser* | Greylag Goose |
| | *Botaurus stellaris* | Great Bittern |
| | *Chlidonias niger* | Black Tern |
| | *Cinclus cinclus* | White-throated Dipper |
| | *Circus aeruginosus* | Western Marsh Harrier |
| | *Fulica atra* | Eurasian Coot |
| | *Motacilla cinerea* | Grey Wagtail |
| | *Pandion haliaetus* | Osprey |
| | *Podiceps cristatus* | Great Crested Grebe |
| Fishes | *Abramis brama* | Bream |
| | *Alburnus alburnus* | Bleak |
| | *Anguilla anguilla* | Eel |
| | *Barbatula barbatula* | Loach |
| | *Blicca bjoerkna* | White Bream |
| | *Esox lucius* | Pike |
| | *Leuciscus idus* | Ide |
| | *Lota lota* | Burbot |
| | *Rutilus rutilus* | Roach |
| | *Salmo trutta trutta* | Sea trout |
| Molluscs | *Ancylus fluviatilis* | Freshwater Limpet |
| | *Anodonta cygnea* | Swan Mussel |
| | *Lymnea sp* | Pond Snail |
| | *Margaritifera margaritifera* | Freshwater Pearl Mussel |
| | *Unio crassus* | Thick-shelled River Mussel |
| Insects | *Baetis rhodani* | No common English name found |
| | *Calopteryx sp.* | Banded and Beautiful Demosielle |
| | *Dytiscus marginalis* | Great Diving Beetle |
| | *Ephemera danica* | No common English name found |
| | *Heptagenia sulphurea* | No common English name found |
| | *Odonata sp.* | Dragonflies |
| | *Perla cephalotes* | No common English name found |
| | *Ranatra linearis* | Water Stick Insect |
| | *Rhyacophila sp.* | No common English name found |
| Arachnids | *Dolomedes plantarius* | Great Raft Spider |
| | *Larinioides sclopetarius* | No common English name found |
| Övr. ryggradslösa djur | *Gammarus pulex* | Freshwater Shrimp |

* Common Swedish names of species are given in the Swedish version of the nomination form: http://www.vattenriket.kristianstad.se/mab/ansokan/index.htm

### 12.1.2. Important natural processes:

| *Natural process* | *Description* |
|---|---|
| Water level variations | On the low-lying Kristianstadsslätten Plain, the River Helge å and surrounding land are affected by seasonal fluctuations in water level. At Kristianstad this fluctuation averages 1.4 m. Salt water regularly penetrates as far inland as Lake Hammarsjön when freshwater flow in the River Helge å is low and the sea level is high. |
| Vegetation encroachment | Lakes and slow-flowing watercourses eventually become shallower due to deposition of alluvium by rivers and accumulation of organic matter as peat. These processes lead to encroachment of vegetation into open water and succession of wetlands towards more terrestrial vegetation. |
| Groundwater outflow | The Kristianstadsslätten Plain contains Sweden's largest reserves of groundwater. Groundwater recharge takes place largely at the margins of the plain and via deposits of coarser grained glaciofluvial sediments. Groundwater flows out from aquifers into wetlands and watercourses. These groundwater-fed small fens and free flowing streams have very good water quality, and experience more moderate annual temperature variations than rain-fed wetlands and streams. |
| Other processes | o Water residence time in lakes.<br>o Flow speed of running water.<br>o Climate (drought, ice movements, etc.).<br>o Grazing of reeds and rushes by Greylag Geese. |

### 12.1.3. Main human impacts:

| *Human impact* | *Description* |
|---|---|
| Eutrophication | Eutrophication leads to vegetation encroachment and increased water turbidity as a result of increased phytoplankton growth. These in turn can lead to sediment anoxia and reductions in oxygen concentrations in water. Eutrophication is caused by nutrients leaching into groundwater and surface water from nearby agricultural land, forests and gardens in the catchment area, as well as discharges from drains and sewage treatment plants. There may also be some contribution from increased nitrogen concentrations in precipitation. |
| Humic acid and transparency | A steady build-up of humic acid in the water has reduced transparency and altered conditions for underwater vegetation. The increase in humic acid is most likely due to a combination of water run-off from artificially drained forests and bogs and acidification in the waters that flow into the River Helge å. |
| Surface water abstraction | The River Helge å and the River Vramsån are subject to substantial water abstraction for agricultural use. Some abstraction of surface water for industrial purposes also takes place. |
| Other impacts | o Historical channel management, such as water level control, filling and dredging, straightening of watercourses and the digging of new channels, have altered aquatic environments. In many cases, the current state of the river channels still reflects the impacts of this previous |

| | |
|---|---|
| | management.<br>o In the past, vegetation cutting has slowed the natural encroachment of vegetation into the open waters of lakes.<br>o Recreational activities (boating, fishing, hunting).<br>o Channel straightening and dredging and tree felling along riverbanks.<br>o Groundwater abstraction.<br>o Thermal impacts arising from discharge of cooling water.<br>o Environmental pollutants. |

**12.1.4. Relevant management practices:**

| *Management practices* | *Description* |
|---|---|
| Ecosystem and landscape preservation | o Retention and restoration of landscape features such as meandering watercourses.<br>o Removal of obstacles to fish migration.<br>o Species-specific conservation measures, e.g. nesting platforms for Black Terns and Ospreys, stream clearance for River Water-crowfoot, riverbank management for Common Kingfishers, nesting pipes for White-throated Dippers and provision of gravel spawning beds for fish and mussels. |
| Reduction of nutrient run-off | o Encouragement of arable practices that reduce fertiliser leaching from fields.<br>o Wetland restoration.<br>o High standard of treatment of effluent from public and private sewage treatment works to reduce nutrient loadings. |
| Regulation of water abstraction | o Sustainable abstraction of surface water and groundwater to secure adequate water flow and prevent deterioration of groundwater quality. |
| Management of hunting and fishing | o Fishery conservation areas.<br>o Management of hunting. |
| Miscellaneous | o Regulation of visitor pressure and boat traffic |

**DISTRIBUTION**

### 12.2. Second type of habitat/land cover: Grazing land and hay meadow

In a number of areas within the biosphere reserve it is possible to find species-rich semi-natural (unimproved) grasslands. The long history of traditional low-intensity land management practices to produce animal fodder has encouraged the development of a species-rich flora. Key elements of this are management by mowing, haymaking or grazing without the use of artificial fertilisers. These areas are most densely concentrated along the River Helge å and the shores of the lakes on Kristianstadsslätten Plain and comprise Sweden's largest expanse of inland grazed and mowed wet grasslands.

Areas of fen and bog are also used to produce fodder. Nutrient poor fens are found on common pasture land on areas underlain by Archean rocks in the west and north. The few remaining nutrient rich fens are found on grazing land and hay meadows in the richer environments on the plain. Species-rich calcareous or highly calcareous fens usually form on calcium-rich soils or in areas where calcium-rich groundwater rises to the surface.

| *Ecosystem* | *Description* |
|---|---|
| *Hay meadows* (Regional/Local) | Most of the hay meadows that were once characteristic of these agricultural areas have been converted into arable or grazing land, or else are no longer managed and have reverted to scrub or woodland. Nevertheless, large tracts of seasonally inundated grassland can still be found along the River Helge å and these are managed by mowing and haymaking and, in some cases, subsequent grazing.<br>Only a few meadows that are managed to produce hay for use as fodder remain in other areas of the biosphere reserve. |
| *Grazing land* (Regional/Local) | In the biosphere reserve, the fodder-producing areas that have been used for grazing in the past range from sandy heaths and dry grasslands to wet grasslands and rich fens. These areas are encountered mainly in old infields and, less commonly, in former outfields. They consist primarily of open grazing land and, to a lesser degree, enclosed pastures with trees. Many of the infields formerly used for haymaking and other fields that became disused in the interim have since been restored to grazing pastureland. On Kristianstadsslätten Plain, outfield grazing land remains at Köpinge Fälad Enclosure and Mosslunda. On Linderödsåsen Ridge it remains in the form of a few juniper enclosures and heaths, for example Boarps hed Heath (one of Skåne's oldest remaining heathlands) and Everöds ora Enclosure. Today, large areas of seasonally inundated grasslands on the plain adjoining the River Helge å are managed by grazing. Much of the poor-quality, sandy ground which used to be farmed under a rotational system that involved grazing during the long intervals of fallow between crop-growing is today used exclusively for grazing. |

### 12.2.1. Characteristic species:

| ***Group*** | ***Scientific name*** | ***Common English name**** |
|---|---|---|
| Vascular plants | *Agrostis canina* | Velvet Bent |
| | *Agrostis capillaris* | Common Bent |
| | *Alopecurus pratensis* | Meadow Foxtail |
| | *Caltha palustris* | Marsh-marigold |
| | *Cardamine pratensis* | Cuckooflower |
| | *Carex spp* | Sedge |
| | *Corynephorus canescens* | Grey Hair Grass |
| | *Deschampsia cespitosa* | Tufted Hair-grass |
| | *Dianthus arenarius* | No common English name found |
| | *Festuca ovina* | Sheep's-Fescue |
| | *Group Orchidaceae* | Orchids |
| | *Helianthemum nummulatium* | Common Rock-rose |
| | *Helichrysum arenarium* | No common English name found |
| | *Koeleria glauca* | No common English name found |
| | *Nardus stricta* | Mat-grass |
| | *Parnassia palustris* | Grass-of-Parnassus |
| | *Polygala vulgaris* | Common Milkwort |
| | *Primula farinosa* | Bird's-eye Primrose |

| | | |
|---|---|---|
| | *Rhinanthus angustifolius* | Greater Yellow-rattle |
| | *Veronica spicata* | Spiked Speedwell |
| Mosses | *Leucodon sciuroides* | No common English name found |
| Fungi | *Agaricus campestris* | Field Mushroom |
| | *Geastrum schmidelii* | No common English name found |
| | *Geoglossum atropurpureum* | No common English name found |
| | *Hygrocybe spp* | Waxcap |
| | *Lycoperdon lividum* | No common English name found |
| | *Tulostoma brumale* | No common English name found |
| Lichens | *Cladina* spp och *Cladonia* spp | Reindeerlichens |
| | *Parmelia saxatilis* | Shield lichen |
| | *Ramalina fraxinea* | No common English name found |
| Mammals | *Microtus agrestis* | Field Vole |
| | *Nyctalus noctula* | Noctule Bat |
| | *Oryctolagus cuniculus* | Rabbit |
| | *Vulpes vulpes* | Red Fox |
| Birds | *Anthus pratensis* | Meadow Pipit |
| | *Carduelis cannabina* | Linnet |
| | *Emberiza citrinella* | Yellowhammer |
| | *Gallinago gallinago* | Common Snipe |
| | *Lanius collurio* | Red-backed Shrike |
| | *Limosa limosa* | Black-tailed Godwit |
| | *Motacilla flava* | Yellow Wagtail |
| | *Numenius arquata* | Eurasian Curlew |
| | *Oenanthe oenanthe* | Northern Wheatear |
| | *Tringa totanus* | Common Redshank |
| | *Vanellus vanellus* | Northern Lapwing |
| Amphibians and reptiles | *Bufo bufo* | Common Toad |
| | *Bufo calamita* | Natterjack Toad |
| | *Lacerta agilis* | Sand Lizard |
| | *Natrix natrix* | Grass Snake |
| | *Rana arvalis* | Moor Frog |
| | *Rana temporaria* | Common Frog |
| | *Triturus vulgaris* | Smooth Newt |
| | *Vipera berus* | Adder |
| Molluscs | *Vertigo pygmaea* | Common Whorl Snail |
| | *Deroceras agreste* | Meadow Slug |
| | *Pupilla muscorum f typica* | No common English name found |
| | *Vertigo antivertigo* | Marsh Whorl Snail |
| Insects | *Cincindela campestris* | Green Tiger Beetle |
| | *Dectius verrucivorus* | Wart-biter Cricket |
| | *Harpalus* spp | Ground Beetle |
| | *Mecostethus grossus* | No common English name found |
| | *Polyommatus icarus* | Common Blue |
| Arachnids | *Pirata piscatorius* | No common English name found |
| | *Pardosa paludicola* | No common English name found |
| | *Drasyllus lutetianus* | No common English name found |
| | *Silometopus elegans* | No common English name found |
| | *Thanatus striatus* | No common English name found |

* Common Swedish names of species are given in the Swedish version of the nomination form: http://www.vattenriket.kristianstad.se/mab/ansokan/index.htm

### 12.2.2. Important natural processes:

| *Natural process* | *Description* |
|---|---|
| Scrub encroachment | When management intensity is reduced or ceases altogether, invasive species of herb take over and shrubs and trees also thrive. In addition to this, in sandy soils there is also a natural process of acidification, which can be offset only by the natural calcium content of the soil and/or by soil disturbance and displacement. |
| Water level variations | More or less extensive flooding has a seasonal impact on grazing and haymaking meadows along the larger watercourses that flow across the plain. |
| Miscellaneous | o Grazing by game animals.<br>o The outflow of groundwater – and groundwater quality – has a significant impact on the ecological characteristics of wet meadows and fens.<br>o Continuous accumulation of organic matter. |

### 12.2.3. Main human impacts:

| *Human impact* | *Description* |
|---|---|
| Mowing, haymaking and grazing | For hundreds of years the traditional management of grazing land and hay meadows has played a crucial role in shaping the diversity of flora and fauna in the area. Trees in and around fodder-producing areas have been pollarded to provide winter feed. The disturbance-dependent vegetation that characterises dry, sandy areas has been preserved by trampling by cattle, ploughing and/or the passage of vehicles. |
| Cessation of mowing, grazing and agricultural intensification | The twentieth century brought a sharp decrease in the areas of natural and semi-natural land used to produce fodder. Some of this is due to cessation of mowing or grazing and/or reduced livestock husbandry. When mowing or grazing reduces in intensity or ceases, the land reverts to scrub and eventually to forest. Land drainage and planting of forests have also contributed to the decline. The remainder is caused by intensification of agriculture, involving increased fertiliser use, reseeding of grasslands and expansion of arable farming. The greatest decline has been seen in hay meadows and today the only area where this habitat remains widespread is along the River Helge å and around the margins of the lakes on Kristianstadsslätten Plain. Use of certain anti-helminthic veterinary medicines has had a negative effect on dung-dependent insects. |
| Atmospheric pollution | Atmospheric pollution, chiefly in the form of nitrogen deposition, has a particularly pronounced impact on vegetation in nutrient-poor grasslands. |

### 12.2.4. Relevant management practices:

| *Management practices* | *Description* |
|---|---|
| Mowing and haymaking | Land that supports species that benefit from mowing and haymaking should be managed in this way, using suitable equipment at appropriate times during the growing season. Post-mowing grazing may also be desirable. |

| | |
|---|---|
| Grazing with a focus on conservation | Land which supports species that are favoured by grazing or general agricultural management activities should be grazed at an appropriate intensity, without the addition of fodder during the growing season. Areas of shrubs, copses and the edges of forests should be retained within the enclosures, though regular scrub clearance may be necessary. Heaths should be burnt in the traditional manner. Regular ploughing can be an important tool in managing sandy areas as part of a rotational system that alternates cultivation and with periods of lying fallow. |
| Restoration | Where possible, older unmanaged fodder-producing areas should be restored and grazing resumed – provided that regeneration has not led to the emergence of new, valuable habitats such as waterside forests or broadleaf woodland. Mowing and haymaking should be resumed in older hay meadows that are currently grazed. This is particularly so for dry to medium dry ground, where few areas are currently managed using mowing and haymaking. Biodiversity can be enhanced in fodder-producing areas by strategic tree-planting and the in-filling of ditches. |

**DISTRIBUTION**

### 12.3. Third type of habitat/land cover: Forests

Over a long period of time man has gradually converted large areas of forest to open landscapes for cultivation, haymaking and grazing. Since the end of the nineteenth century, however, planned reforestation and spontaneous regeneration of forests have taken place, especially on the areas of Archean rocks within the biosphere reserve and in wetter areas on the plain that are no longer actively managed.

The Archean ridges of Linderödsåsen and Nävlingeåsen in the south-western part of the biosphere reserve and Balsberget Hill in the north are largely forested. Smaller areas of woodland are scattered across the open plain and along the coast. The forested areas span the full wetness gradient, ranging from dry pine forests along the coast and on rocky plateaux in the north to various types of damp forest and woodland that flood regularly when water levels are high.

| *Ecosystem* | *Description* |
|---|---|
| **Deciduous forest** | |
| ***Broadleaf forest***<br>*Beech forest*<br>(Regional/Local) | The Common Beech (*Fagus sylvatica*) characterised the old outfields and now occurs mainly on the areas of Archean rock in the biosphere reserve, where it is often the dominant tree species. High plateaux and other thin soils host species-poor upland beech forests while richer lowland beech forests can be found lower down on slopes and in other areas that are more fertile and/or have flowing groundwater close to the surface. |
| *Other Broadleaf forests*<br><br>(Regional/Local) | The biosphere reserve also contains smaller areas of mixed broad leaved forest containing species such as Wych Elm (*Ulmus glabra*), Ash (*Fraxinus excelsior)*, Small Leafed Lime (*Tilia cordata*), Norway Maple (*Acer platanoides*) and/or |

| | |
|---|---|
| | Hornbeam (*Carpinus betulus*). Oak has been an important species in infields and outfields alike. Pedunculate Oak (*Quercus robur*) grows in thin and fertile soils alike, while the less common Sessile Oak (*Quercus petraea*) is primarily found on hilly slopes with thin soil. |
| *Alder forest and other wet broadleaf forest*<br><br>(Regional/Local) | Along the larger watercourses and at the margins of the lakes on the plain are periodically inundated shoreline forests and wet forests where Alder *(Alnus glutinosa)* predominates, together with lesser concentrations of Downy Birch *(Betula pubescens)* and Ash. These are mainly young forests growing on land that was formerly open and managed. Nevertheless, they often are high in natural values. Within the biosphere reserve, alder carrs are most numerous in areas of Archean rocks. |
| *Riparian scrub*<br>(Regional/Local) | Widespread riparian scrub containing a variety of willow species (*Salix* spp) is found on formerly managed and grazed open ground adjacent to the large watercourses on the plain. |
| **Coniferous forest** | |
| *Pine forest*<br>(Regional/Local) | Stands of Scots Pine (*Pinus sylvestris*) and Dwarf Mountain Pine (*Pinus mugo*) have been planted on sandy ground along the coast and also in the interior of the plain to reduce movement of wind-blown sand. Natural pine forest in the biosphere reserve is found primarily on the thin rocky plateaux and mires present in the areas of Archean rocks. |
| *Spruce forest*<br>(Regional/Local) | Norway Spruce (*Picea abies*) is a northern species that has expanded southwards. The southern limit of its natural range lies 10–15 km north of the biosphere reserve. The end of the nineteenth century saw the start of widespread planting of Norway Spruce. There is no quantitative estimate of the proportion of Norway Spruce in the biosphere reserve today relative to other tree species, but it is certainly the most common species. |

### 12.3.1. Characteristic species:

| ***Group*** | ***Scientific name*** | ***Common English name**** |
|---|---|---|
| Vascular plants | *Allium ursinum* | Ramsons |
| | *Calluna vulgaris* | Heather |
| | *Deschampsia flexuosa* | Wavy Hair-grass |
| | *Empetrum nigrum* | Crowberry |
| | *Galium odoratum* | Woodruff |
| | *Lamiastrum galeobdolon* | Yellow Archangel |
| | *Mercurialis perennis* | Dog's Mercury |
| | *Oxalis acetosella* | Wood-sorrel |
| | *Pyrola sp.* | Wintergreen |
| | *Stellaria nemorum* | Wood Stitchwort |
| | *Vaccinium myrtillus* | Bilberry |
| | *Vaccínium vitis-idaéa* | Cowberry |
| Mosses | *Dicranum polysetum* | Wavy Dicranum |
| | *Dicranum scoparium* | Brook Moss |
| | *Homalothecium sericeum* | No common English name found |
| | *Hypnum cupressiforme* | Hypnum Moss |
| | *Mnium undulatum* | No common English name found |

| | | |
|---|---|---|
| | *Pleurozium schreberi* | No common English name found |
| | *Rhytidiadelphus loreus* | No common English name found |
| Fungi | *Amanita gemmata* | No common English name found |
| | *Amanita phalloides* | Death Cap |
| | *Coprinus picaceus* | No common English name found |
| | *Gyrodon lividus* | No common English name found |
| | *Hypholoma fasciculare* | No common English name found |
| | *Lactarius blennius* | No common English name found |
| | *Lactarius deterrimus* | No common English name found |
| | *Lactarius quietus* | No common English name found |
| | *Lycoperdon echinatum* | No common English name found |
| | *Marasmius alliaceus* | No common English name found |
| | *Paxillus filamentosus* | No common English name found |
| | *Russula mairei* | No common English name found |
| | *Suillus variegatus* | No common English name found |
| Lichens | *Evernia prunastri* | Oakmoss Lichen |
| | *Pertusaria amara* | Bitter Wart lichen |
| | *Pseudovernia furfuracea* | No common English name found |
| | *Pyrenula nitida* | No common English name found |
| Mammals | *Alces alces* | Moose |
| | *Apodemus flavicollis* | Yellow-necked Mouse |
| | *Capreolus capreolus* | Roe Deer |
| | *Cervus dama* | Fallow Deer |
| | *Eptesicus nilssoni* | Northern Bat |
| | *Martes martes* | Pine Marten |
| | *Pipistrellus pipistrellus* | Common Bat (Common Pipistrelle) |
| | *Sciurus vulgaris* | Red Squirrel |
| | *Sus scrofa* | Wild Boar |
| Birds | *Aegithalos caudatus* | Long-tailed Tit |
| | *Buteo buteo* | Common Buzzard |
| | *Carduelis spinus* | Eurasian Siskin |
| | *Coccothraustes coccothraustes* | Hawfinch |
| | *Dendrocopus minor* | Lesser Spotted Woodpecker |
| | *Falco subbuteo* | Eurasian Hobby |
| | *Fringilla coelebs* | Common Chaffinch |
| | *Hippolais icterina* | Icterine Warbler |
| | *Milvus milvus* | Red Kite |
| | *Parus cristatus* | Crested Tit |
| | *Parus montanus* | Willow Tit |
| | *Parus palustris* | Marsh Tit |
| | *Phoenicurus phoenicurus* | Common Redstart |
| | *Pyrrhula pyrrhula* | Eurasian Bullfinch |
| | *Tringa ochropus* | Green Sandpiper |
| | *Turdus philomelos* | Song Thrush |
| Amphibians and reptiles | *Anguis fragilis* | Slow Worm |
| | *Lacerta vivipara* | Viviparous Lizard |
| | *Rana arvalis* | Moor Frog |
| Molluscs | *Acanthinula aculeata* | Prickly Snail |
| | *Arion ater* | European Black Slug |
| | *Clausilia bidentata* | Two-toothed Door Snail |
| | *Cochlicopa lubrica* | Slippery Snail |
| | *Cochlodina laminata* | Plaited Door Snail |
| | *Helix pomatia* | Roman Snail |
| | *Perforatella incarnata* | No common English name found |
| | *Succinea putris* | No common English name found |
| Insects | *Aglia tau* | Tau Emperor |
| | *Argynnis paphia* | Silver-washed Fritillary |
| | *Calospilus sylvata* | No common English name found |
| | *Carabus coriaceus* | Ground Beetle |
| | *Geotrupes stercorosus* | Dor Beetle |

| | | |
|---|---|---|
| | *Pararge aegeria* | Speckled Wood |
| | *Rhyncaenus fagi* | No common English name found |
| | *Saperda scalaris* | No common English name found |
| | *Sinodendron cylindricum* | Rhinoceros Beetle |
| | *Vespa crabro* | Hornet |
| Arachnids | *Bathyphantes nigrinus* | No common English name found |
| | *Diplocephalus latifrons* | No common English name found |
| | *Pachygnatha listeri* | No common English name found |
| | *Pardosa saltans* | No common English name found |
| Other invertebrates | *Armadillidium cinereum* | No common English name found |
| | *Julius sp.* | No common English name found |
| | *Philoscia muscorum* | No common English name found |

* Common Swedish names of species are given in the Swedish version of the nomination form: http://www.vattenriket.kristianstad.se/mab/ansokan/index.htm

### 12.3.2. Important natural processes:

| *Natural process* | *Description* |
|---|---|
| Internal forest dynamics | Deciduous forests that are allowed to develop and regenerate naturally are characterised by natural species succession, age variation, a large proportion of old, mature trees, and decaying wood of varying dimensions and in various states of decomposition. |
| Climate variations | Forest flora and fauna are adapted to seasonal variations in temperature within the biosphere reserve. Periods of extreme cold, unseasonable cold snaps, wet snow and storms place a considerable strain on plant and animal life. Forests growing on sandy ground on the plain and on the rocky plateaux in areas of Archean rocks are especially vulnerable to drought. |
| Water level variations | Alluvial deciduous forests and riparian scrub situated in the vicinity of larger rivers on the plain are affected by greater and lesser seasonal variations in water levels as well as by the formation of ice. |
| Effect of grazing | Pollen analysis reveals that the forests of southern Sweden tended historically to have a mosaic-like structure and were more open than previously thought. One of the chief reasons for this is thought to be the major impact that grazing animals have had on the landscape ever since prehistoric times. |
| Miscellaneous | o Accumulation of organic matter<br>o Grazing by game animals<br>o Pests<br>o Fire |

### 12.3.3. Main human impacts:

| *Human impact* | *Description* |
|---|---|
| Cultivation | Over a very long period of time man has progressively converted large areas of forest to open countryside for cultivation, haymaking and grazing. Since the end of the nineteenth century, however, forests have been replanted and spontaneous regeneration has also occurred – especially in the areas of Archean rocks within the biosphere reserve and on wetter areas of the plain that are no longer |

| | |
|---|---|
| | actively managed. |
| Forestry | Forests have long served as an important source of timber and firewood for household use and commercial purposes alike. Much of the woodland within the biosphere reserve is used for commercial forestry. This has led to a predominance of dense, high-yielding monocultures of Norway Spruce and, to a lesser extent, of Scots Pine and Common Beech. In these areas there is a general dearth of mature trees of wide girth and a lack of decaying wood, while the proportion of deciduous species in coniferous stands is generally low. Felling is carried out when the trees are still relatively young and before they have reached a sufficient age to serve as a host for many forest-dwelling organisms.<br><br>Many other aspects of modern forestry also impact on biodiversity and the ecological balance. These include: prevalence of monocultures that increase vulnerability to pests; habitat fragmentation caused by clear-felling and construction of forest tracks; changes in the aquatic environment due to drainage, ditch clearance and vehicle damage to wetlands; and the introduction of trees of alien species and alien provenance. |
| Miscellaneous | o Introduction of alien species, e.g. the Roman Snail (*Helix pomatia*), Fallow Deer (*Dama dama)* and Brown Hare (*Lepus europaeus*).<br>o Hunting.<br>o Cessation of forest grazing.<br>o Pollution from air (acid precipitation and nitrogen deposition).<br>o Ash emissions from the forestry industry. |

### 12.3.4. Relevant management practices:

| *Management practices* | *Description* |
|---|---|
| Conservation-friendly forestry | Forestry will continue to be practised in most of the woodland areas in the biosphere reserve. It is therefore vital that it takes account of the species that occur in the forests and enables them to remain there in a natural state and in self-sustaining populations. Wet forests and other woodland areas exhibiting the characteristics of natural forest should always be exempted from forestry operations. |
| Deciduous forestry | Insofar as is possible, forestry in the biosphere reserve should focus on naturally occurring tree species such as deciduous trees and Scots Pine. |

**DISTRIBUTION**
**12.3. Fourth type of habitat/land cover: Coastal ecosystems**

| *Ecosystem* | *Description* |
|---|---|
| *Landscapes of extensive sand dunes* (Regional/Local) | The southern stretch of coastline is characterised by long sandy beaches protected by dunes that are up to 1 km wide in places. Towards the northern perimeter of the biosphere reserve the nature of the coastline gradually changes. There are a number of offshore islands and much of the sea bed consists of gravel and stones originating from the glacial tills.<br>Pine plantations exist as a shelter belt along parts of the coast (see 12.3 "Forests", above). At Äspet, outside the town of Åhus, the sand dunes are associated with an area of lagoons and sandbars. These provide an important habitat for breeding, migrant and wintering birds. |

### 12.4.1. Characteristic species:

| ***Group*** | ***Scientific name*** | ***Common English name**** |
|---|---|---|
| Vascular plants | *Ammophila arenaria* | Marram |
| | *Atriplex* spp | Orache spp |
| | *Cakile maritima* | Sea Rocket |
| | *Calluna vulgaris* | Heather |
| | *Carex arenaria* | Sand Sedge |
| | *Corynephorus canescens* | Grey Hair Grass |
| | *Elytrigia repens* | Common Couch |
| | *Lathyrus japunicus* | Sea Pea |
| | *Leymus arenarius* | Lyme-grass |
| | *Hieracium umbellatum* | No common English name found |
| | *Petasites spurius* | No common English name found |
| | *Pinus sylvestris* | Scots Pine |
| Mosses | *Racomitrium canescens* | No common English name found |
| | *Syntrichia ruraliformis* | No common English name found |
| Svampar | *Amanita gemmata* | Gemmed Amanita |
| | *Suillus variegatus* | Velvet Bolete |
| Lavar | *Cladina* spp +*Cladonia* spp | Reindeer lichen and others |
| | *Cornicularia aculeata* | No common English name found |
| Mammals | *Capreolus capreolus* | Roe Deer |
| | *Pipistrellus pipistrellus* | Common Bat (Common Pipistrelle) |
| | *Sciurus vulgaris* | Red Squirrel |
| Birds | *Anthus campestris* | Tawny Pipit |
| | *Caprimulgus europaeus* | European Nightjar |
| | *Charadrius hiaticula* | Common Ringed Plover |
| | *Loxia pytopsittacus* | Parrot Crossbill |
| | *Lullula arborea* | Wood Lark |
| | *Parus cristatus* | Crested Tit |
| | *Parus montanus* | Willow Tit |
| | *Phoenicurus phoenicurus* | Common Redstart |
| | *Recurvirostra avosetta* | Pied Avocet |
| | *Sterna albifrons* | Little Tern |
| | *Tadorna tadorna* | Shelduck |
| Insects | *Coenomympha pamphilus* | Small Heath Butterfly |
| | *Formica rufa* | Southern Wood Ant |
| | *Hipparchia semele* | Grayling |
| | *Myrmeleon formicarius* | Antlion |
| Arachnids | *Aelurillus v-insignatus* | No common English name found |

| | | |
|---|---|---|
| | *Alopecosa fabrilis*<br>*Xerolycosa miniata* | No common English name found<br>No common English name found |

* Common Swedish names of species are given in the Swedish version of the nomination form: http://www.vattenriket.kristianstad.se/mab/ansokan/index.htm

### 12.4.2. Important natural processes:

| *Natural process* | *Description* |
|---|---|
| Dune formation and vegetation succession | Sand washed up by the sea is carried by the wind until it encounters an obstacle, around which a sand dune starts to form. Small primary dunes develop into white dunes with tussocks of grass and ultimately evolve into grey dunes supporting mosses, lichens and vascular plants. Eventually they become wooded. |
| Erosion and accumulation | Wave action erodes material from the beach and seabed and sorts and transports it along the coast, leading to beach erosion and accumulation of sand. The nature of Hanöbukten Bay and its beaches suggest that its state is relatively stable, apart from the sandbars and lagoons south of the pier at Äspet. |
| Water level variations | Tides as such do not occur in the Baltic Sea but sea levels do change according to season, weather conditions, etc. The average water level in Åhus Harbour is 0.05 metres above sea level, while the maximum level is 1.11 metres above sea level and the minimum level is 0.9 metres below sea level. |
| Ice movements | During cold winters, the movements of ice can loosen sessile organisms. |

### 12.4.3. Main human impacts:

| *Human impact* | *Description* |
|---|---|
| Built-up areas and recreation | A number of old communities with a long tradition of fishing and seafaring exist along the coast. During the twentieth century a large number of homes were built in and around these areas and other stretches of coastline.<br><br>Damage to vegetation as a result of trampling in areas popular for swimming and other recreational activities results in the local loss of vegetation and subsequent erosion. Animal life may also suffer disturbance from visitors and their pets. Further impacts include car parks and the construction of other amenities and the removal of seaweed from beaches. |
| Harbour walls and infilling | The coastline has been affected by human activity since the eighteenth century when the River Helge å gained a new outfall into the sea at the village of Yngsjö after farmers there dug a channel through the sand dunes which the river then captured. In the twentieth century walls were built on both sides to prevent the river mouth silting up.<br>The gradual expansion of the harbour, including infilling and the construction of piers at the River Helge å's old outfall in Åhus, has radically changed the coastline to the north by shifting it outward and causing the formation of sandbars and lagoons. |
| Planting of protective | Widespread planting of Scots Pine has taken place over the past |

| | |
|---|---|
| conifer shelter belts | few hundred years to counteract sand movement, transforming the once-open grassland ecosystem. |

### 12.4.4. Relevant management practices:

| *Management practices* | *Description* |
|---|---|
| Minimal exploitation | No construction of built-up areas or development of sand or gravel production pits should take place in areas that are currently undeveloped or not covered by municipal planning proposals. |
| Minimisation of erosion damage caused by recreational activities or forestry | Outdoor leisure activities should be regulated and directed so as to minimise damage to the terrestrial environment. In the same way, it is important that forestry activities are carried out in a way that minimises damage to sand dunes and their vegetation. However, some limited wear and tear in open sandy areas may be beneficial to certain species. |

## DISTRIBUTION

## 12.5. Fifth type of habitat/land cover: Marine ecosystems

The coastal waters of Hanöbukten Bay that fall within the biosphere reserve are part of the Baltic Sea and are brackish, with a surface water salinity of 7–8 ‰.

| *Ecosystem* | *Description* |
|---|---|
| *Coastal marine area* (Regional/Local) | The northern and north-eastern coasts are characterised by a shallow, undulating seabed rich in underwater vegetation and marine life. In southern areas, where the seabed is deeper and flatter, currents prevent sediment accumulation. |

### 12.5.1. Characteristic species:

| ***Group*** | ***Scientific name*** | ***Common English name**** |
|---|---|---|
| Macroalgae | *Ectocarpus* spp | No common English name found |
| | *Fucus vesiculosus* | Bladder Wrack |
| | *Fucus serratus* | Toothed Wrack |
| | *Pilayella littoralis* | No common English name found |
| | *Polysiphonia fucoides* | No common English name found |
| | *Rhodomela subfusca* | No common English name found |
| Vascular plants | *Potamogeton pectinatus* | Fennel Pondweed |
| | *Ruppia* spp | Tasselweeds |
| | *Zannichellia palustris* | Horned Pondweed |
| | *Zostera marina* | Eelgrass |
| Birds | *Mergus serrator* | Red-breasted Merganser |
| | *Somateria mollissima* | Eider |
| | *Tadorna tadorna* | Shelduck |
| Fishes | *Anguilla anguilla* | Eel |
| | *Clupea harengus* | Atlantic Herring |
| | *Gadus morhua* | Atlantic Cod |
| | *Myoxocephalus scorpius* | Shorthorn Sculpin |
| | *Platichthys flesus* | Flounder |
| | *Salmo trutta trutta* | Salmon Trout |
| Molluscs | *Macoma baltica* | No common English name found |
| Other invertebrates | *Bathyporeia pilosa* | No common English name found |
| | *Pygospio elegans* | No common English name found |

* Common Swedish names of species are given in the Swedish version of the nomination form: http://www.vattenriket.kristianstad.se/mab/ansokan/index.htm

### 12.5.2. Important natural processes:

| *Natural process* | *Description* |
|---|---|
| Currents | Subtidally, sediments are transported and redeposited by shifting currents. |
| Water level variations | Tides as such do not occur in the Baltic Sea, but sea levels do change according to season, weather conditions, etc. The average water level in Åhus Harbour is 0.05 metres above sea level, the maximum water level 1.11 metres above sea level and the minimum water level 0.9 metres below sea level. |
| Waves | Many organisms in shallow environments are exposed to wave action and are liable to be washed away, so they require special adaptations to enable them to remain in place. |

### 12.5.3. Main human impacts:

| *Human impact* | *Description* |
|---|---|
| Eutrophication | The discharge of nutrients such as nitrogen and phosphorus increased dramatically in the second half of the twentieth century, resulting in increased plankton populations in the water, reduced transparency and lower oxygen concentrations. This nutrient run-off comes from both diffuse and point sources. |
| Environmental toxins | Heavy metals and harmful organic compounds generated by human activities end up in the sea and accumulate in the food chain. |
| Fishing | Since the Middle Ages, fishing has been an important source of income for coastal communities. Commercial fishing takes place within the biosphere reserve and the main target species are Eel (*Anguilla anguilla*), Salmon Trout (*Salmo trutta*), Pike (*Esox lucius*), Perch (*Perca fluviatilis*) and Flounder (*Platichthys flesus*), and, to a lesser degree, Cod (*Gadus morhua*) and Turbot (*Psetta maxima*). Recreational fishing is also increasing in the area. |
| Miscellaneous | o Boat transport (deliberate or accidental discharge of pollutants, noise, physical presence).<br>o Spread of alien organisms. |

### 12.5.4. Relevant management practices:

| *Management practices* | *Description* |
|---|---|
| Reduce pollutants | o Construct nutrient traps in arable and forested areas to reduce leakage of nutrients into the sea.<br>o Further improve standards of wastewater purification to remove nutrients and environmental toxins. |
| Fisheries management | Fishing is subject to regulations in respect of catch quotas, minimum sizes, fishing tackle and fishing seasons. These regulations vary depending on the species involved. More work is needed to improve the protection of fish spawning and nursery grounds. |

**DISTRIBUTION**

### 12.6. Sixth type of habitat/land cover: Arable land

| *Ecosystem* | *Description* |
|---|---|
| *Arable land* (Regional/Local) | Arable land dominates large areas of Kristianstadsslätten Plain but occurs in a more mosaic-like pattern in areas underlain by Archean rocks. Geological conditions also influence the structure of agricultural land on the plain, with large fields on well sorted soils and a patchwork pattern of fields and grazing pasture in areas of glacial tills. In sandy areas, some fields lie fallow for varying lengths of time. |
| *Orchards* (Regional/Local) | A number of commercial orchards are located north of Österslöv. |

#### 12.6.1. Characteristic species:

| ***Group*** | ***Scientific name*** | ***Common English name**** |
|---|---|---|
| Vascular plants | *Solanum tuberosum, Beta vulgaris, Hordeum vulgare, Secale cereale, Triticum aestivum, Daucus carota ssp. sativus* | Potato, Beet, Barley, Rye, Bread Wheat, Carrot |
| | *Cirsium arvense* | Creeping Thistle |
| | *Consolida regalis* | Forking Larkspur |
| | *Senecio vernalis* | Eastern Groundsel |
| Mammals | *Capreolus capreolus* | Roe Deer |
| | *Lepus europaeus* | Brown Hare |
| Birds | *Alauda arvensis* | Skylark |
| | *Carduelis carduelis* | Goldfinch |
| | *Corvus frugilegus* | Rook |
| | *Perdix perdix* | Grey Partridge |
| | *Phasianus colchicus* | Pheasant |
| | *Vanellus vanellus* | Lapwing |
| Amphibians and reptiles | *Bufo bufo* | Common Toad |
| | *Lacerta agilis* | Sand Lizard |
| | *Natrix natrix* | Grass Snake |
| | *Rana arvalis* | Moor Frog |

* Common Swedish names of species are given in the Swedish version of the nomination form: http://www.vattenriket.kristianstad.se/mab/ansokan/index.htm

#### 12.6.2. Important natural processes:

Most of the natural ecosystem processes have been greatly modified and harvests are primarily affected by factors such as drought, rain and temperature.

#### 12.6.3. Main human impacts:

| *Human impact* | *Description* |
|---|---|
| Rationalisation of farming | Far-reaching changes have taken place in farming since the nineteenth century and these in turn have greatly altered the landscape. Use of artificial fertilisers and pesticides, the removal of obstructions to mechanical cultivation (microhabitats such as trees, mounds, ditches and minor expanses of water, etc.) and technological progress have made larger harvests possible but have also reduced the opportunities for animal and plant life in and around the areas under cultivation. A large proportion of the |

| | |
|---|---|
| | thin, sandy soils formerly managed via a rotational system of cultivation and fallow currently serve either as grazing land (see 12.2, "Grazing land and hay meadows" above) or are unmanaged, used for intensive cultivation of crops requiring large inputs of fertiliser, water and pesticides, or have been converted into pine plantations. This trend continues, albeit more slowly than in the past. |
| Erosion | When vegetation cover is lacking, the fertile top layer of exposed, lightweight soil is blown away by strong winds. |
| Miscellaneous | o Introduction of alien species and strains<br>o Development for housing or infrastructure<br>o Cessation of farming<br>o Hunting |

#### 12.6.4. Relevant management practices:

| *Management practices* | *Description* |
|---|---|
| Environmentally-conscious farming | o Use of farming and fruit-growing methods that minimise adverse environmental impacts and benefit animal and plant life in agricultural areas.<br>o Create wetlands on low-yielding arable land to promote nutrient salt uptake or biomass fuel production. |
| Traditional methods of cultivation | Find practicable and financially viable ways of protecting or remediating habitats for animals and plants within the framework of modern, intensive farming. A rotational system of cultivation, with long periods of fallow, should be resumed on area of thin, sandy soils. |

**DISTRIBUTION**

### 12.7. Seventh type of habitat/land cover: Built-up areas

A large number of villages and towns with residential, commercial or industrial buildings are located in the biosphere reserve. The character of these environments has generally been greatly altered by development, but there are still some small areas where the original habitat and/or land cover remains intact.

| *Ecosystem* | *Description* |
|---|---|
| *Urban centre* (Regional/Local) | Kristianstad urban centre is the only area in the biosphere reserve that is entirely occupied by buildings. |
| *Residential areas* (Regional/Local) | In the larger communities, apartment blocks with communal open spaces can be found alongside houses with private gardens. The latter form of housing predominates in smaller villages and hamlets. Sizeable concentrations of summer cottages exist along the coastal strip. |
| *Industrial areas* (Regional/Local) | Industrial areas are usually located in and around the larger communities, although some small industrial areas do exist in the countryside. |

### 12.7.1. Characteristic species:

The flora in built-up areas is characterised by introduced species, with a lesser proportion of naturally occurring plants. Much of the vegetation has been planted and typically requires large quantities of water and fertiliser. Brownfield flora predominates in industrial areas, while alien species spread by vehicles or cargo consignments can often be found in and around depots and other international transport zones.

| ***Group*** | ***Scientific name*** | ***Common English name**** |
|---|---|---|
| Vascular plants | *Bellis perennis* | Daisy |
| | *Chenopodium sp* | No common English name for the group |
| | *Rumex sp* | No common English name for the group |
| | *Senecio vernalis* | Eastern Groundsel |
| | *Stellaria media* | Common Chickweed |
| | *Taraxacum sect. Ruderalia* | Dandelion |
| Fungi | *Coprinus comatus* | The Shaggy Mane |
| | *Marasmius oreades* | Fairy Ring Mushroom |
| Mammals | *Eptesicus nilssoni* | Northern Bat |
| | *Erinaceus europaeus* | Hedgehog |
| | *Mus musculus* | House Mouse |
| | *Rattus norvegicus* | Brown Rat |
| | *Talpa europaea* | Mole |
| Birds | *Corvus monedula* | Jackdaw |
| | *Passer domesticus* | House Sparrow |
| | *Passer montanus* | Tree Sparrow |
| | *Phoenicurus ochruros* | Black Redstart |
| | *Pica pica* | Magpie |
| Insects | *Músca doméstica* | House Fly |
| Arachnids | *Salticus scenicus* | No common English name found |
| | *Zygiella x-notata* | No common English name found |

* Common Swedish names of species are given in the Swedish version of the nomination form: http://www.vattenriket.kristianstad.se/mab/ansokan/index.htm

### 12.7.2. Important natural processes:

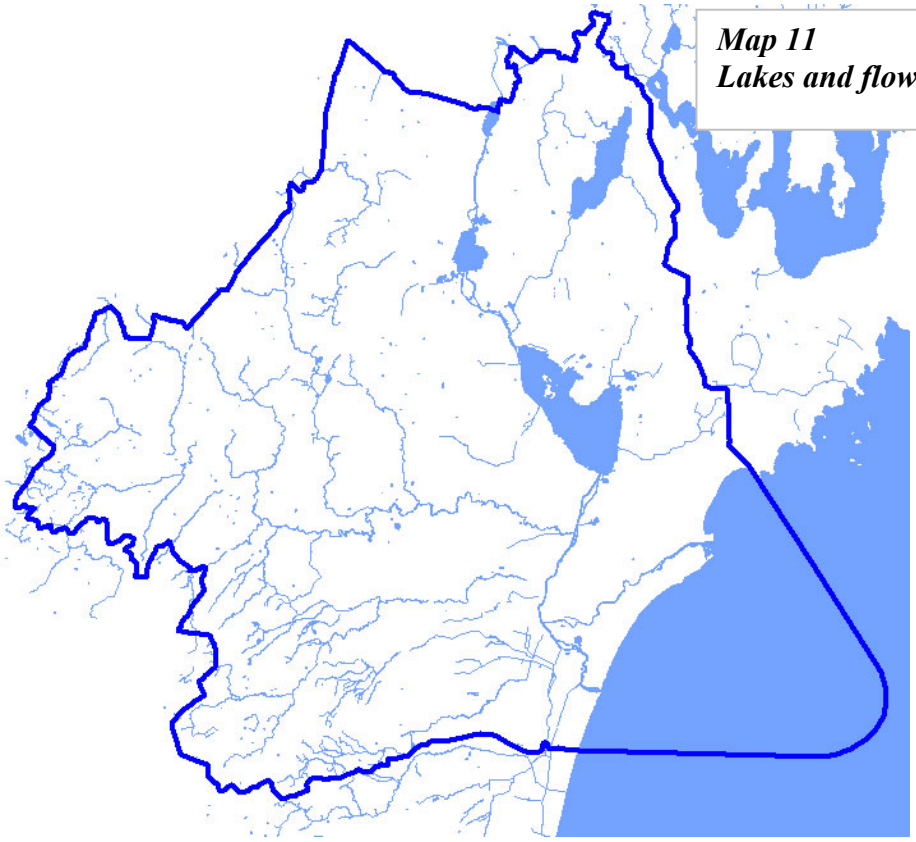
The natural processes that occur in areas with more intact habitat/land cover types may resemble those in the habitat/land cover types described above, but often exhibit some degree of disturbance. Extremely high water levels in the River Helge å are one natural process that is regarded as especially problematic. Kristianstad makes intensive efforts to protect itself against the impact of high river levels.

### 12.7.3. Main human impacts:

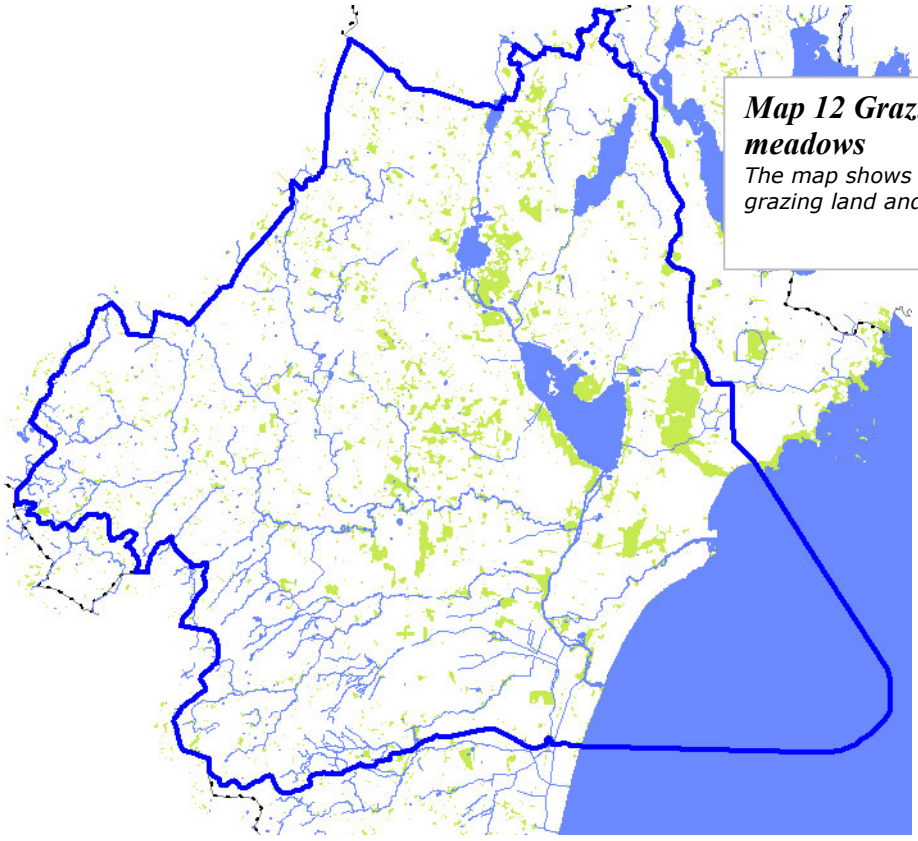
Human impacts in areas with intact or relatively intact habitat/land cover types are usually similar to the impacts described earlier in this chapter. Impacts resulting from wastewater, surface water, atmospheric emissions and noise are often more pronounced in and around built-up areas.

### 12.7.4. Relevant management practices:

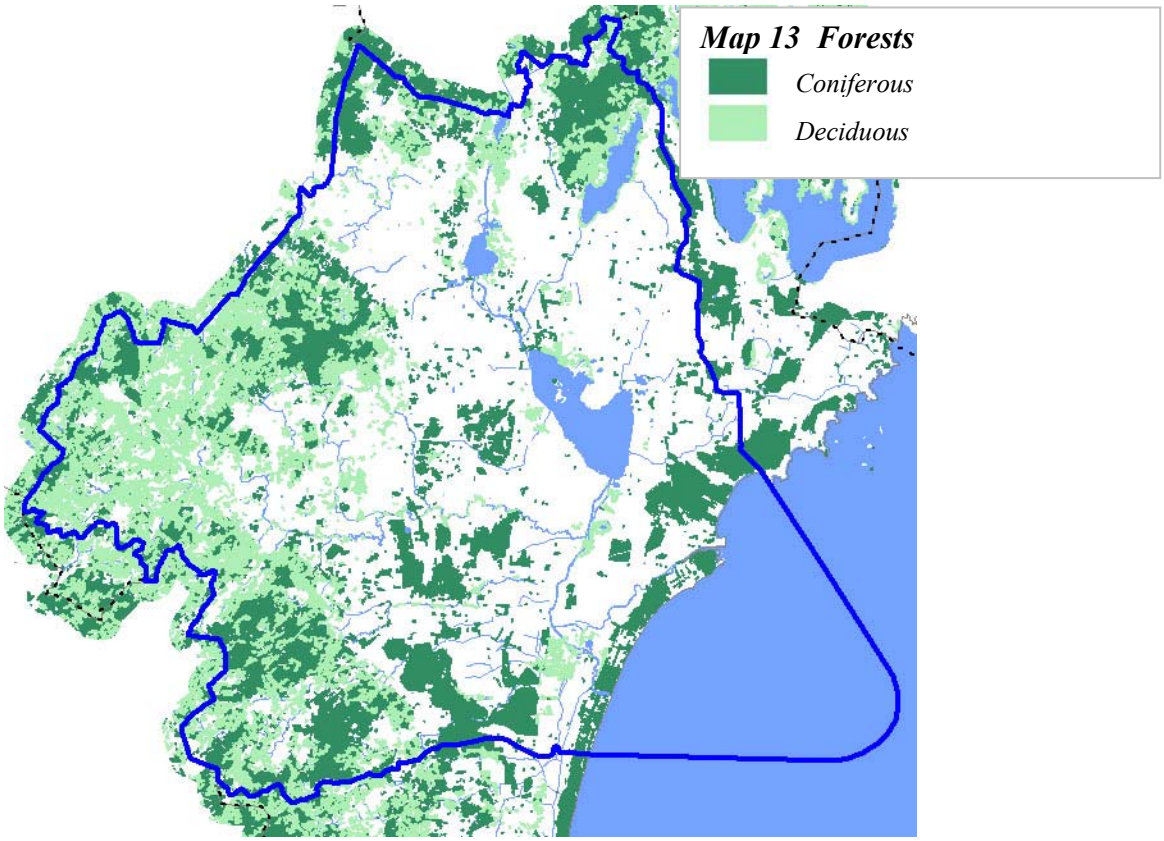
Active management is lacking in the majority of the areas with intact or relatively intact habitat/land cover types. However, plans are under way to resume the management of certain heritage landscapes, for example grazing pastures and sandy terrain, with a rotational system of cultivation and fallow.

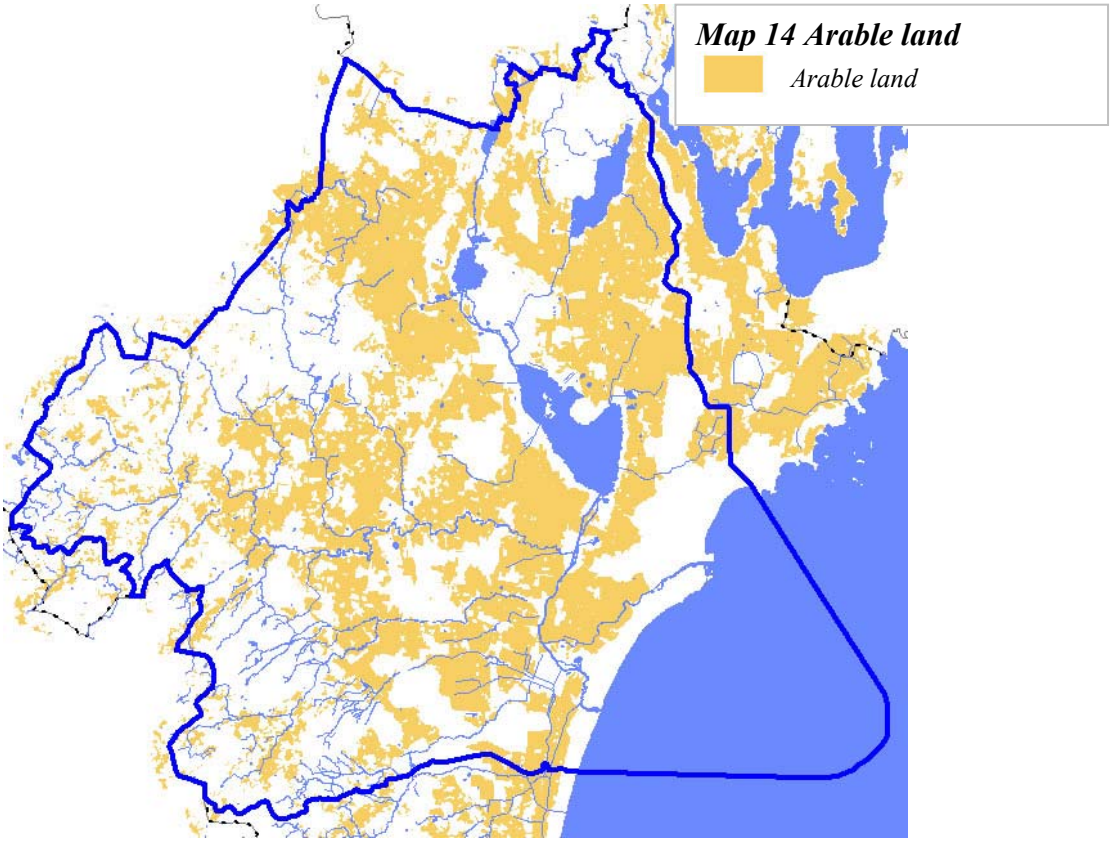


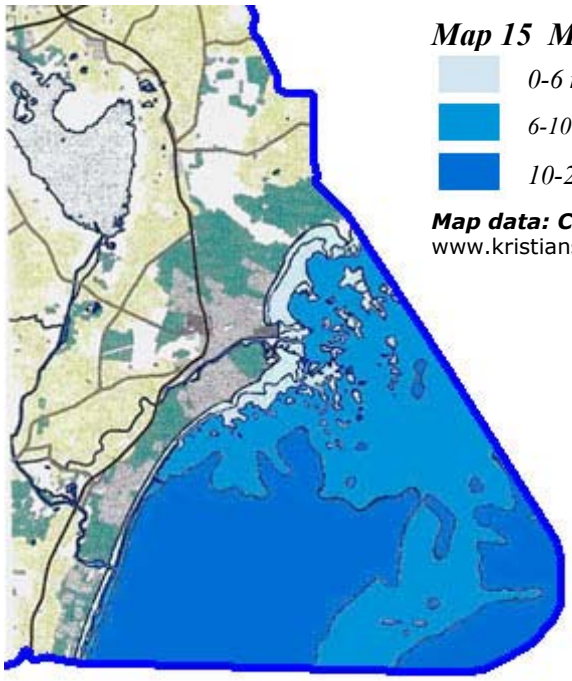
***Map 11***
***Lakes and flowing water***



***Map 12 Grazing land and hay meadows***
*The map shows open terrain, such as grazing land and hay meadows.*


Map 13 Forests
Coniferous
Deciduous


Map 14 Arable land
Arable land



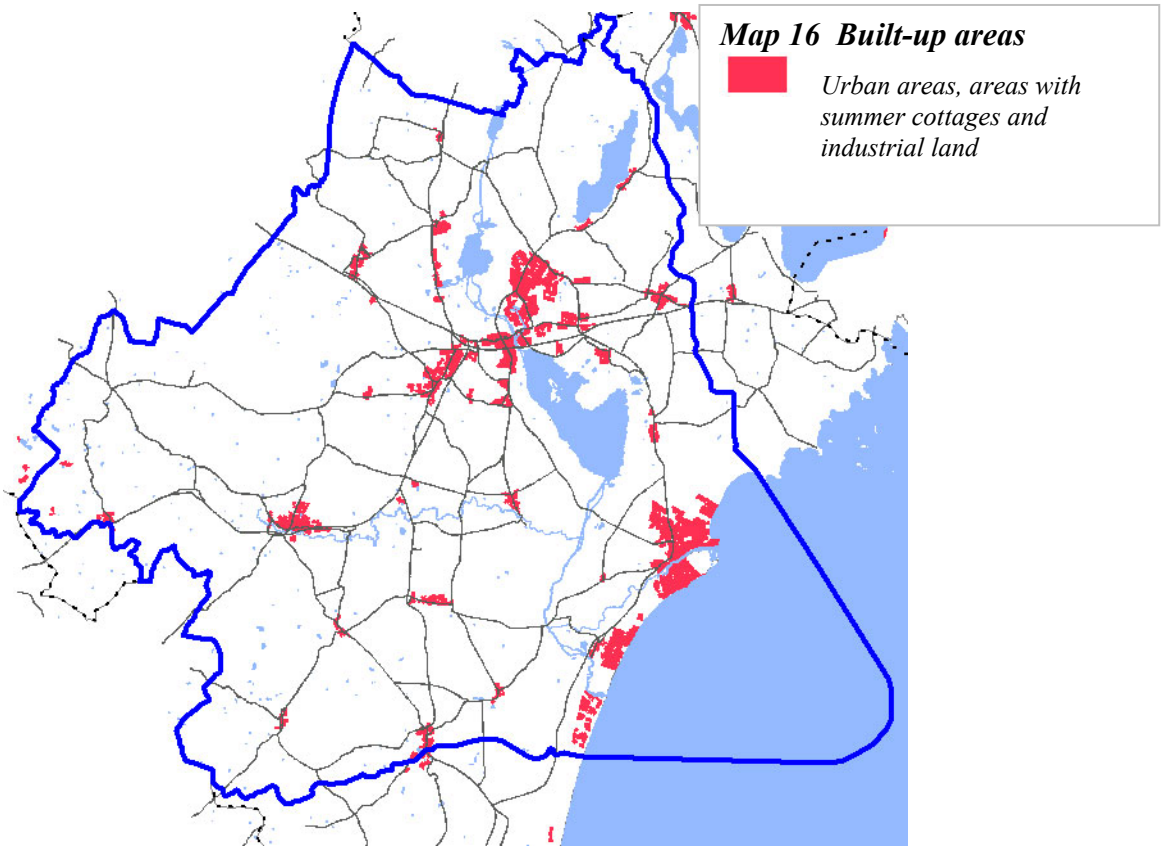
***Map 15 Marine areas***

*0-6 m deep*

*6-10 m deep*

*10-20 m deep*

***Map data: Coastal water depths***
www.kristianstad.se



***Map 16 Built-up areas***

*Urban areas, areas with summer cottages and industrial land*

## 13. CONSERVATION FUNCTION

### 13.1. Contribution to the conservation of landscape and ecosystem biodiversity

[Describe and give location of landscapes, ecosystems, habitats and/or land cover types of particular significance for the conservation of biological diversity.]

The proposed biosphere reserve includes the lower drainage basin of the River Helge å in the Municipality of Kristianstad and the coastal waters of Hanöbukten Bay. It is situated in a cultural landscape containing a large number of habitat and land cover types on the Kristianstadsslätten Plain and surrounding Archean rock areas. All of these play a vital role in conserving biodiversity.

A number of theme areas with high natural values have been identified within the proposed biosphere reserve. The presentations that follow are based on these theme areas, which are as follows:

- The rich wetlands along the River Helge å
- Tributaries of the River Helge å originating on Linderödsåsen Ridge
- Rich woods and forests on the slopes of Linderödsåsen Ridge
- Balsberget Hill and Lake Råbelövssjön
- Ancient trees and wooded habitats in cultivated areas
- Sandy grasslands formerly managed under a rotational system of cultivation and fallow
- The coastal landscape with extensive sand dunes
- The coastal waters of Hanöbukten Bay
- Urban natural values
- Groundwater (presentation in Chapter 11)

**The rich wetlands along the River Helge å**

The River Helge å is the largest river in Skåne, and its lower reaches, from Torsebro in the north to where it flows into Hanöbukten Bay, form the main artery of the proposed biosphere reserve. The river and its surrounding wetlands comprise a natural environment that is unparalleled in Sweden today, a water-dependent cultural landscape that is a stronghold for many of the plant and wildlife species that belong to the old agricultural landscape.
The majority of the natural values derive from agricultural management in the form of haymaking and grazing and are dependent on annual flooding. The area is home to Sweden's largest expanse of inland wet grasslands used for grazing and haymaking. These grasslands extend over a total of some 1,620 hectares and are to a large degree calcareous. Reedbeds, riparian scrub and wet deciduous forests have grown up on stretches of the river where land management has declined or ceased. The wet forests typically contain a high proportion of decaying wood. The River Helge å broadens into two large, shallow lakes on Kristianstadsslätten Plain: Lake Araslövssjön and Lake Hammarsjön. This entire wetland area is protected by the Ramsar Convention on Wetlands and currently encompasses six nature reserves and 20 Natura 2000 sites.

The various aquatic and terrestrial environments along the River Helge å create conditions for great biological diversity. With its breadth of aquatic environments, the River Helge å and its associated waters possess one of the widest varieties of fish species of any water system in Sweden. The river and the lakes on the plains, together with the seasonally inundated grasslands used for grazing and haymaking and other rich wetlands that surround these water systems, support a diverse range of breeding, migrant and wintering bird species. The

nutrient-rich fens (especially calcareous fens with springs) host an exceptional range of terrestrial molluscs, including a number of red-listed or rare species. Sweden has a heavy responsibility to conserve many of these exclusive species since the lime-rich habitats in which they occur have suffered even greater degradation in continental Europe than in Sweden. Many other groups of animals, such as dragonflies and terrestrial beetles, also depend on the River Helge å and its wetlands. Lake Hammarsjön boasts a very rich underwater flora, while the rest of the area also has high botanical values thanks to good natural conditions and the proximity of managed wet grasslands. The large tracts of seasonally inundated grasslands used for haymaking (totalling approximately 520 hectares) constitute an environment that promotes the survival of species that are dependent on mowing and haymaking.

There are many reasons why these habitats remain intact in the proposed biosphere reserve and, unlike those in many other areas of the country, have not been swallowed up by rationalisation. One reason is that the area is so low-lying: it is practically at sea level, which has made it difficult to drain lakes and ditch other areas. Another reason is the natural fertilisation of these grasslands as a result of seasonal flooding, which means that, after being allowed to dry out, these habitats provide good harvests of hay that can be cut with conventional harvesting equipment.

**Tributaries of the River Helge å originating on Linderödsåsen Ridge**
The River Helge å is fed by numerous tributaries on its course between Torsebro and the sea. Those with their source on Linderödsåsen Ridge possess particularly high natural values, thanks partly to the superior quality of their water. Many of the watercourses that originate on the ridge flow down the steep north-eastern slope. Here, the rushing waters have carved out a number of deep ravines, including those at Forsakar and Åbjär. After these watercourses leave the slopes and flow into Kristianstadsslätten Plain their character changes and they meander through the agricultural landscape bounded by zones of marshy meadow, waterside forest and grazing land. Many of the smaller watercourses are tributaries of the River Vramsån and the River Mjöån. The River Vramsån drains large portions of the north-facing slope of Linderödsåsen Ridge. In parts it flows rapidly, in others slowly, and it supports a highly diverse range of species, including all seven Swedish species of large freshwater mussel. Though relatively short, the River Mjöån has the greatest fall from source to mouth of any River Helge å tributary. One of its sources lies some 180 metres above sea level on Fjällmossen Bog. It is also one of Skåne's cleanest watercourses and is a haven for many sensitive aquatic organisms. The watercourses originating on Linderödsåsen Ridge are currently included in four Natura 2000 areas, while a small stretch of Forsakarsbäcken Brook enjoys nature reserve status.

**Rich woods and forests on the slopes of Linderödsåsen Ridge**
Large areas of broadleaf forests extend over the steep north-eastern slope of Linderödsåsen Ridge. These forests often have a long history of continuity. Beech dominates but ash, oak, birch, hornbeam and elm are also plentiful.

Forests with especially high natural values are found, among other places, in the ravines that have been cut by streams in the side of the ridge. The wooded slopes are home to a rich variety of vascular plants, characterised here and there by calcareous soils and groundwater that lies close to the surface.

Here, too, are the necessary conditions to support important populations of lichens, mosses and fungi and a rich variety of wildlife that boasts a very large number of highly selective forest-dwelling species, such as molluscs and beetles. The broadleaf forests at Maltesholm are home to a flora and fauna unique in Sweden: some 60 species of mollusc and more than 1 200 species of beetle have been recorded here.

More than half of Sweden's threatened invertebrates depend on wooded environments, especially habitats that include broadleaf trees, old hollow trunks and decaying wood. On the north-eastern slope of Linderödsåsen Ridge there is one nature reserve and four Natura 2000 areas. Sweden's National Board of Forestry has also designated more than 100 subsidiary areas as part of its national woodland key habitats survey.

**Balsberget Hill and Lake Råbelövssjön**
Balsberget Hill and Lake Råbelövssjön are located where the sedimentary bedrock of Kristianstadsslätten Plain meets the areas of Archean rocks to the north. Balsberget Hill is dominated by rationally managed beech woods, though areas of woodland with long ecological continuity and natural values remain in ravines and on rocky slopes with thin soil. The limestone caverns at Balsberget Hill constitute one of the largest cave systems in Skåne. The broadleaf forests that stand at the foot of the hill in what was formerly a cultivated area on the margins of the western shores of Lake Råbelövssjön are, in parts, fairly rich and possess high natural values. Lake Råbelövssjön itself is a nutrient-rich expanse of water that is completely different in character from the other lakes in the proposed biosphere reserve. At approximately 11 metres it is deeper than the other lakes: it is also fed mainly by groundwater and has a very long water residence time. Rich in stoneworts and vascular plants, it is an important stop-over site for migrant birds including Smew (*Mergus albellus*). The combination of forested slopes and lake water constitutes a valuable habitat for a variety of insect, bat and bird species that occur in terrestrial and aquatic environments. Parts of Balsberget Hill have nature reserve status and the area also includes two Natura 2000 areas. The National Board of Forestry has designated approximately 20 woodland key habitats in the area.

**Ancient trees and wooded habitats in cultivated areas**
Ancient trees growing in agricultural areas are important for many animal and plant species, not least on the flat Kristianstadsslätten Plain. They also add to the aesthetic quality of the landscape. Most valuable from the perspective of biodiversity are free-standing or sparsely grouped old trees in sunny spots. Old-growth oak is by far the most important tree type, but other old and preferably pollarded broadleaf trees such as elm, lime and ash also provide essential habitats for numerous animal and plant species. These include insects, bats, birds, lichens, mosses and fungi. Some species depend on old willows, which used to be a much more familiar feature of the landscape in the form of willow banks and avenues. Like many other old trees of great girth, however, these have fallen victim to the rationalisation of agriculture and are now restricted largely to rural estates, parks, cemeteries and larger rural properties. They also occur as roadside avenues and boundary markers and (less commonly these days) in enclosures. The drastic decline in large, old deciduous trees in agricultural areas is compounded by an almost total absence of younger trees to eventually take their place. This poses a serious problem for the future. In conjunction with its key habitats survey, the National Board of Forestry has compiled a register of very large (or "ancient") trees. The survey was carried out on forested land and in areas adjacent to other land types. The Skåne branch of the Swedish Society for Nature Conservation has also conducted a successful project that focuses on ancient trees in Skåne.

**Sandy grasslands formerly managed under a rotational system of cultivation and fallow**
The sandy grasslands of Kristianstadsslätten Plain that once were managed under a rotational system of cultivation and fallow are an ancient feature of the cultural landscape. In many instances historical patterns of cultivation were closely linked to the seasonally inundated grasslands on the margins of the region's lakes and major watercourses. The hay from these meadows provided winter fodder for livestock, which in turn supplied fertiliser for the thin, sandy soils in the fields. Some of these soils were so poor that cultivation was only possible after several years of fallow during which the land was usually grazed by livestock. This rotational system of cultivation and fallow created a special type of landscape with a unique flora and fauna. Though mainly used for grazing nowadays, large areas still remain at Ripa sandar, Rinkabyfältet and Lyngsjö. These sites support rich insect and avian populations since they retain a flora characteristic of dry meadows, sandy heaths and many areas of the threatened Natura 2000 habitat, xeric sand calcareous grasslands. These xeric sand calcareous grasslands host a highly specialised form of vegetation (even in a wider, global perspective) which depends on a dry, sunny climate and sandy, calcareous soil that requires repeated disturbance and displacement in order to expose fresh sand. These grasslands are concentrated to eastern Skåne, where there are between 70 and 90 known sites (most of them in the municipality of Kristianstad) with an aggregate area of some 20–30 hectares.
The sandy grasslands of the proposed biosphere reserve form part of five Natura 2000 areas.

**The coastal landscape with extensive sand dunes**
Along the coast, the sandy terrain of Kristianstadsslätten Plain is replaced by long stretches of sandy beaches and dunes that have been partially planted with pine to reduce the movement of wind-blown sand. The open areas of sand dunes and the sparse pine forests are home to a noteworthy flora and fauna that merits conservation. Some of the species present here also occur in areas of natural dunes that have subsequently been developed for housing.

At Äspet, south of the town of Åhus, there are 35 hectares of beach, shallow lagoons and sandbars outside the pine-clad sand dunes. This area is an important resting site for many migrant bird species and has also become an increasingly important breeding ground in recent years. There are currently two nature reserves and three Natura 2000 areas along the coast.

**The coastal waters of Hanöbukten Bay**
The coastal waters of Hanöbukten Bay also form part of the proposed biosphere reserve. The bay is part of the Baltic Sea, whose salt content of 7–8 ‰ distinguishes it as the world's largest expanse of brackish water, and is home to a unique mix of freshwater and saltwater fish. The former are found in waters close to the coast, while the latter occur both in the coastal zone and further out to sea. The northern and eastern parts of Hanöbukten Bay that fall within the proposed biosphere reserve comprise a shallow seabed (0–6 m) that varies between soft and hard in consistency and hosts a marine flora and fauna that is rich in certain areas. In the east of the area, the Kiviksbredan shallows serve as an important nursery for a number of fish species. The shallow waters are also important for many shorebird and waterfowl species, not only as foraging grounds during the spring and autumn migrations, but also as wintering areas for certain species. In southern areas, the seabed is deeper and flatter: here subtidal sediments are transported and deposited by shifting currents. Parts of the marine environment are included in one nature reserve and two Natura 2000 areas.

**Urban natural values**
The River Helge å passes through two towns: Kristianstad, with 29,000 inhabitants, and Åhus, with just over 8,000 residents. Kristianstad is located at the centre of the valuable area of rich

wetlands that form the nucleus of the proposed biosphere reserve, while Åhus is situated on the coast at the mouth of the river. This means that the extensive natural values present in these aquatic environments are located directly adjacent to and partly within two urban areas. Forests and sandy ground are two other habitats with similar associations with built-up areas. Proximity to urban areas poses a potential threat to these natural values at the same time as it creates opportunities for their conservation. For instance, the areas offer substantial opportunities for recreation and outdoor activities close to centres of population.
The natural values that exist here have been largely covered in the theme areas already described, but focusing on them from an urban perspective enables us to highlight the specific opportunities and challenges that they represent.

Examples of urban natural values include the White-tailed Eagle (*Haliaeetus albicilla*), which can be seen flying over Kristianstad on a daily basis during winter, the Peregrine Falcon (*Falco peregrinus*), which winters around the Kristianstad water tower, and the Common Kingfisher (*Alcedo atthis*) and Western Marsh Harrier (*Circus aeruginosus*), which breed just a few hundred metres from the city centre. An additional natural value is angling, a pastime carried out on the riverbanks in Kristianstad and Åhus. It is important to preserve the substantial annual fluctuations in the water level in the River Helge å in and around Kristianstad while at the same time ensuring that the town is protected from flooding. The natural grazing land and areas of deciduous woodland on the northern periphery of Kristianstad and the sandy grasslands in and to the west of Åhus are types of landscape that can be integrated as a resource for local residents.

In addition to natural values, the local urban areas contain values created by man. Examples include the moats that once protected the former walled stronghold of Kristianstad, the Ekenabben wet forest, which developed after the area had been quarried in the 1860s for glacial till used to build the Nosaby Dyke, and the sandy districts around Åhus with their long tradition of extensive farming.

The areas of Kristianstad covered by city planning regulations include one Ramsar Convention site, two nature reserves and four Natura 2000 areas. The corresponding areas in Åhus include one nature reserve and one Natura 2000 area, with a further two Natura 2000 areas in the immediate vicinity.

**Additional areas**
In addition to the theme areas already described, the proposed biosphere reserve includes other types of landscape and ecosystem that are extremely significant for maintaining biodiversity.
One is the centuries-old landscape shaped by widespread small-scale grazing and cultivation practices that continued well into the twentieth century and that is found in areas of Archean rocks. Subsequently, however, much of this has either been planted with trees or has reverted to forest, but some vestiges of unfertilised grazing land, small patchwork fields and grazed outfields do remain. These include the outfields of the village of Everöd (Kungsoran), heathlands such as Boarps hed and bogs such as Fjällmossen, all of which serve as important habitats for certain types of flora and fauna. The Kristianstadsslätten Plain also contains scattered vestiges of unfertilised grazing land of an ancient character (for example, at Mosslunda) that hosts a diverse variety of flora species dependent on active land management.

## 13.2. Conservation of species biodiversity

[Identify main species (with scientific names) or groups of species of particular interest for the conservation of biological diversity, in particular if they are rare or threatened with extinction; use additional sheets if need be.]

### Globally red-listed species, nationally red-listed species and those listed by the EU as threatened

At least 711 nationally red-listed species, 59 species listed by the EU as threatened and 22 globally red-listed species have been recorded in the proposed biosphere reserve. Kristianstads Vattenrike has access to up-to-date knowledge on many species groups, but information on others is limited or lacking. Data is based on records and research from 1970 onwards. A more comprehensive list of globally red-listed and nationally red-listed species, as well as those listed by the EU as threatened, is contained in appendices 6a–6f.

A large number of red-listed species, along with many others that merit conservation, are extremely important to the biodiversity of the area. This may be because other organisms depend directly on them: alternatively, they may play an indirect role in the ecosystem by having highly specialised habitat requirements or, because of their sensitivity to change, by acting as indicators of the high natural values present in the ecosystem. Some species do not fall into the above categories but nevertheless warrant conservation within the proposed biosphere reserve since they already are or risk becoming rare either nationally or internationally, or because they are living at the outer limit of their natural range. Many of the species are directly associated with one of the theme areas. Globally red-listed and nationally red-listed species, as well as those listed as threatened by the EU, are described below by class.

### Mammals

The proposed biosphere reserve contains two globally red-listed mammal species – the Pond Bat (*Myotis dasycneme*) and the Red Squirrel (*Sciurus vulgaris*). The squirrel is very common in the area, but is threatened in Europe because of growing habitat fragmentation and its displacement in many other European countries by its introduced congener, the Grey Squirrel. Four nationally red-listed bat species occur in the area. In addition to the Pond Bat, these are the Whiskered Bat (*Myotis mystacinus*), Natterer's Bat (*Myotis natteri*) and Nathusius's pipistrelle (*Pipistrellus nathusii*).

### Birds

Three globally red-listed bird species occur regularly in the proposed biosphere reserve: Corn Crake (*Crex crex*), Great Snipe (*Gallinago media*) and White-tailed Eagle (*Haliaeetus albicilla*). Between 150 and 200 White-tailed Eagles visit the proposed biosphere reserve and the surrounding coastline during winter and it is possible to see around 50–75 individuals at the same time. This makes the area one of the most important wintering grounds for the species in Sweden.

Of the species listed in the EU Birds Directive, 43 regularly breed or rest in the area. Fifty-nine nationally red-listed bird species occur in the area.

#### *Birds associated with wetlands and watercourses*

Species such as Black-tailed Godwit (*Limosa limosa*), the *schinzii* subspecies of Dunlin (*Calidris alpina schinzii*) and Garganey (*Anas querquedula*) occur on wet grasslands used for grazing and haymaking. Large expanses of reedbeds also host a rich avian fauna, including Great Bittern (*Botaurus stellaris*), Bearded Reedling (*Panurus biarmicus*) and Western Marsh Harrier (*Circus aeruginosus)*, the latter a species that is doing well in Sweden but is listed by

the EU as threatened. The Eurasian Penduline Tit (*Remiz pendulinus*) relies on areas that are reverting to scrub, while the Lesser Spotted Woodpecker (*Dendrocopus minor*) is among the species found in wet forests.

Species classed as red-listed and listed by the EU as threatened that occur on lakes include Black Tern (*Chlidonias niger*) and Spotted Crake (*Porzana porzana*). Common Pochard (*Aythya ferina*) and Smew (*Mergus albellus*) rest in large numbers at Lake Råbelövssjön, close to Balsberget Hill in the north of the region.

Rivers with banks and uprooted trees provide nesting sites for Common Kingfisher (*Alcedo atthis*).

***Birds associated with woodland***
The proposed biosphere reserve hosts red-listed species that include Stock Dove (*Columba oenas*) and European Honey-buzzard (*Pernis apivorus*) (also listed by the EU) as well as healthy populations of two species listed by the EU as threatened: Black Woodpecker (*Dryocopus martius*) and Red Kite (*Milvus milvus*).

***Birds associated with sandy areas and landscapes with extensive sand dunes***
A number of red-listed species, including Tawny Pipit (*Anthus campestris*) (also listed by the EU) Common Quail (*Coturnix coturnix*) and Grey Partridge (*Perdix perdix*), are more or less dependent on or beneficiaries of the sandy areas within the proposed biosphere reserve.

Open areas of sand dunes provide breeding grounds for the EU-listed Wood Lark (*Lullula arborea*), while the red-listed (and also EU-listed) European Nightjar (*Caprimulgus europaeus*) breeds in pine plantations on the sand dunes.

***Reptiles and amphibians***
No globally redlisted reptiles or amphibians have been observed within the area, but the Great-crested Newt (*Triturus cristatus*), which is sensitive to acidic water and requires large, permanent expanses of water for spawning, is listed by EU. A further four nationally red-listed amphibian and reptile species are found in the area. The Natterjack Toad (*Bufo calamita*) occurs primarily in and around sandy habitats, such as old gravel pits, ponds and on well-managed land. The Sand Lizard (*Lacerta agilis*) lives in dry areas which have a long continuity as open landscape and a favourable climate: typically, these are south-facing slopes, railway lines and the edges of forest in rolling countryside. The Grass Snake (*Natrix natrix*) is common in wetland areas.

***Fish***
The lower reaches of the River Helge å system host what is, by Swedish standards, a very rich diversity of fish. Four globally red-listed species have been caught inside the proposed biosphere reserve over the past 20 years: River Lamprey (*Lampetra fluviatilis*), Brook Lamprey (*Lampetra planeri*), Ziege (*Pelecus cultratus*) and Cod (*Gadus morhua*).

Of the nine nationally red-listed fish species, Loach (*Barbatula barbatula*) and Gudgeon (*Gobio gobio*) have healthy populations, and the European Catfish (*Silurus glanis*) is increasing after several years of good breeding success following its reintroduction into the area in 1999. Atlantic Salmon (*Salmo salar*) (listed by EU) and European Chub (*Leuciscus cephalus*) are two other red-listed species that occur in the area.

Lampreys such as River Lamprey (*Lampetra fluviatilis*) and Sea Lamprey (*Petromyzon marinus*) also occur in the proposed biosphere reserve but their populations are possibly declining. The Bullhead (*Cottus gobio*) has a healthy population in Sweden and is found in watercourses on Linderödsåsen Ridge, but is listed as threatened by the EU.

***Insects***

Our knowledge about the various groups of insect that occur in the proposed biosphere reserve varies. Studies have been carried out to ascertain the prevalence of certain insect groups in specific biotopes. In other cases, however, data is lacking.

Six of the insect species known to occur in the proposed biosphere reserve are globally red-listed. Three of these are beetles: Blue Ground Beetle (*Carabus intricatus*), which has one of its few known haunts in Sweden at Forsakar, and Hermit Beetle (*Osmoderma eremita*), which is found primarily in areas with ancient oaks and European Great Diving Beetle (*Dytiscus latissimus*) which is common in river Helge å. Other globally red-listed insect species are Green Hawker (*Aeshna viridis)*, Large Blue (*Maculinea arion*) and Red Wood Ant (*Formica rufa).*

At least four of the species named in the EU's Habitat Directive occur in the area. Three are beetles – European Great Diving Beetle (*Dytiscus latissimus*) Stag Beetle (*Lucanus cervus*) and Hermit Beetle (*Osmoderma eremita*) – and the fourth is a butterfly, the Silver-spotted Skipper (*Hesperia comma*).

A total of 344 insect species are nationally red-listed. Of these, approximately 230 are beetles, 85 are butterflies or moths and 10 are species of dragonfly or mayfly.

***Insects associated with wetlands and watercourses***

The seasonally inundated grasslands along the lower reaches of the River Helge å are home to a rich diversity of beetle species, including a number of red-listed ground beetles (*Carabidae*) and rove beetles (*Staphylinidae*) that find it easier to survive in areas where the land is managed in some way. These include the ground beetles *Agonum marginatum* and *Chlaenius nigricornis* and the rove beetle *Manda mandibularis*.

The wood-dwelling Musk Beetle (*Aromia moschata*), which usually occurs in fairly old, sunlit willow (S*alix*), may be found even in central Kristianstad. The rich wetlands are also home to a diverse array of dragonfly species, including Common Winter Damselfly (*Sympecma fusca*), Small Emerald Damselfly (*Lestes virens*) and Green Hawker (*Aeshna viridis*), which is globally red-listed but has a healthy population in Sweden.

The watercourses that have their source on Linderödsåsen Ridge contain a rich demersal fauna that includes a number of groups of organism that serve as environmental barometers and whose presence indicates favourable conditions for biodiversity. Among the red-listed, pollution-sensitive mayflies (*Ephemeroptera*) and stoneflies (*Plecoptera*), the following species occur: *Rhithrogena germanica*, *Brachyptera braueri* and *Capnia nigra*.

***Insects associated with woodland***

The forests of the proposed biosphere reserve support a rich insect fauna that includes a wide variety of species that depend generally on deciduous forest or, more specifically, on particular tree species. Click beetles (*Elateridae*) occur only in places with large, old-growth deciduous trees. The red-listed click beetle *Procraeus tibialis* has been observed in the

proposed biosphere reserve. Wood-dwelling beetles include the following red-listed species, all of which depend on different types of decaying deciduous wood: *Anoplodera scutellata*, *Anaglyptus mysticus* and *Cossonus parallelepipedus*. The previously mentioned, globally red-listed Blue Ground Beetle (*Carabus intricatus*) also falls into this category. The ancient oaks in the proposed biosphere reserve support Hermit Beetle (*Osmoderma eremita*) (globally red-listed and listed by the EU as threatened) and Stag Beetle (*Lucanus cervus*) (listed by the EU).

***Insects associated with sandy areas and landscapes with extensive sand dunes, etc.***
The open, dry sandy areas of Kristianstadsslätten Plain support an insect fauna that is unique in Sweden. Many of the species are red-listed and some are under severe pressure, yet their presence highlights the high natural values that exist in these habitats. They include four leaf beetles: *Galeruca interrupta*, *Strophosoma faber*, *Coniocleonus hollbergi* and *Hypera dauci*. The presence of dung beetles such as *Onthophagus fracticornis*, *Onthophagus nuchicornis*, *Onthophagus similis*, *Aphodius sordidus* and *Emus hirtus* testifies to the existence of unfertilised, well-managed natural pastures in open sandy areas. This is further confirmed by the presence of the most warmth-dependent species, *Copris lunaris*, *Aphodius quadriguttatus* and *Aphodius scrofa*. Species requiring pure sand devoid of vegetation include *Harpalus melancholicus*, *Harpalus hirtipes*, *Harpalus servus* and *Harpalus picipennis*. The first two prefer flat sandy ground, while the latter two also occur on scree slopes.

The red-listed moth *Spuleria flavicaput* can be found in hawthorn in certain areas of the proposed biosphere reserve.

**Arachnids**
Great Raft Spider (*Dolomedes plantarius)*, the only globally red-listed arachnid in the proposed biosphere reserve, can be found in proximity to areas of still water. Another species, a pseudoscorpion (*Anthrenochernes stellae*), is included in the EU Habitat Directive and is also on the national red list. In addition there are four red-listed species of spider in the area. These are: *Micaria lenzi*, which has only been found in Sweden at a very limited number of sites in Skåne; *Brommella falcigera*, about whose range and population little is known at present; *Alopecosa cursor*, which in Sweden is only known to occur at a few sites in the landscape of sand dunes in eastern Skåne; and *Philodromus fallax,* which inhabits sandy beaches.

**Molluscs**
A rich variety of terrestrial and aquatic molluscs can be found in the proposed biosphere reserve. Five species are globally red-listed, three of which are mussels found in the River Vramsån: Thick-shelled River Mussel (*Unio crassus*), Freshwater Pearl Mussel (*Margaritifera margaritifera*) and Compressed River Mussel (*Pseudanodonta complanata*). All depend on a healthy environment and access to appropriate host fish species for their reproduction. The other two globally red-listed species are Geyer's Whorl Snail (*Vertigo geyeri*) and Narrow-mouthed Whorl Snail *(Vertigo angustior)*, which both live in nutrient-rich fens within the Ramsar Convention site. The rest of the terrestrial mollusc fauna in the rich wetlands is varied and includes several red-listed species, including *Cochlicopa nitens*, which is a barometer for changes in hydrological conditions in nutrient-rich fens and rich wet deciduous forests. Like many other wetland molluscs, it is sensitive to heavy grazing.

The broadleaf forests of the proposed biosphere reserve supports a number of organisms whose presence denotes long forest continuity and the existence of high natural values.

Mollusc species in this category include the red-listed *Spermodea lamellata*, *Macrogastra ventricosa* and *Perforatella bidentata*.

***Vascular plants and stoneworts***
Three EU-listed plant species are found, all in very different biotopes. These are *Dianthus arenarius*, which occurs in a number of dry, sandy sites, Fen Orchid (*Liparis loeselii*), found in a few calcareous fens and Slender Naiad (*Najas flexilis*), whose only known site in Sweden is Lake Hammarsjön. In all, 106 nationally red-listed vascular plant species and two red-listed stoneworts are found in the area.

***Vascular plants associated with wetlands and watercourses***
The River Helge å and the lakes of the proposed biosphere reserve provide habitats for a large number of red-listed species whose presence indicates the existence of high natural values. These species include vascular plants such Lesser Marshwort (*Apium inundatum*), Whorl-grass (*Catabrosa aquatica*) and Musk Orchid (*Herminium monorchis*), all of which depend on grazing or mowing. One notable vascular plant species that occurs in areas which are subject to flooding and are reverting to scrub along the lower reaches of the river is Fen Ragwort (*Senecio paludosus*), which has its Nordic stronghold here.

Lake Hammarsjön hosts a highly diverse range of pondweed types (*Potamogeton spp*). Thirteen 13 species were recorded here in the 1990s, including the red-listed Shetland Pondweed (*Potamogeton rutilis*) and Grass-wrack Pondweed (*Potamogeton compressus*). The extensive stonewort flora that is present also merits conservation. Stoneworts dominate the underwater flora of Lake Råbelövssjön and their sensitivity to eutrophication means they are regarded as ecosystem barometers. Many of the species that are extant in Sweden are today deemed to be under threat. Other notable plant species that occur in Lake Råbelövssjön are Soft Hornwort (*Ceratophyllum submersum*) and Flat-stalked Pondweed (*Potamogeton friesii*).

The River Vramsån was formerly the only known site in Sweden for River Water-Crowfoot (*Ranunculus fluitans*). However, this species is now also known to occur in the lower reaches of the River Mjöån, which are also within the proposed biosphere reserve.

***Vascular plants associated with woodland***
Red-listed vascular plants in this category include Perennial Honesty (*Lunaria rediviva*) and Wood Fescue (*Festuca altissima*), both of which are indicator species in forests.

***Vascular plants associated with sandy areas and landscapes with extensive sand dunes***
The flora that thrives on xeric sand calcareous grasslands is characterised by *Koeleria glauca* and *Dianthus arenarius* and complemented by other red-listed species that also occur on other types of dry, sandy land. These include *Anthericum liliago*, Sand Cat's-tail (*Phleum arenarium*), *Festuca polesica*, *Minuartia viscosa*, *Astragalus arenarius*, Bur Medick (*Medicago minima*) and *Succisa pratensis*.

Two other red-listed plant species are *Chimaphila umbellata*, which is found in the pine forests in landscapes with extensive sand dunes, and Sea-holly (*Eryngium maritimum*), which occurs on open raised beaches by the sea.

**Mosses**
No moss species that are globally red-listed or listed by the EU as threatened have been reported from the proposed biosphere reserve, although 10 nationally red-listed moss species are present. Noteworthy among these are *Loeskeobryum brevirostre* and *Trichocolea tomentella*, both of which are indicators of forests with high natural values.

**Fungi**
No fungi species that are globally red-listed or listed by the EU as threatened are found in the proposed biosphere reserve, but 118 nationally red-listed fungi species have been recorded. These include *Cortinarius anserinus*, *Cortinarius cinnabarinus*, *Dentipellis fragilis*, *Mycena renat*), Spiny Puffball (*Lycoperdon echinatum*) and Old Man of the Woods (*Strobilomyces strobilaceus*), as well as the wood-dwelling Beefsteak Fungus (*Fistulina hepatica*) and Warted Oak Polypore (*Inonotus dryadeus*).
Fungi found on sandy ground include Nail Fungus (*Poronia punctata*), which is dependent for its existence on horse manure on continuously grazed sandy pastures.

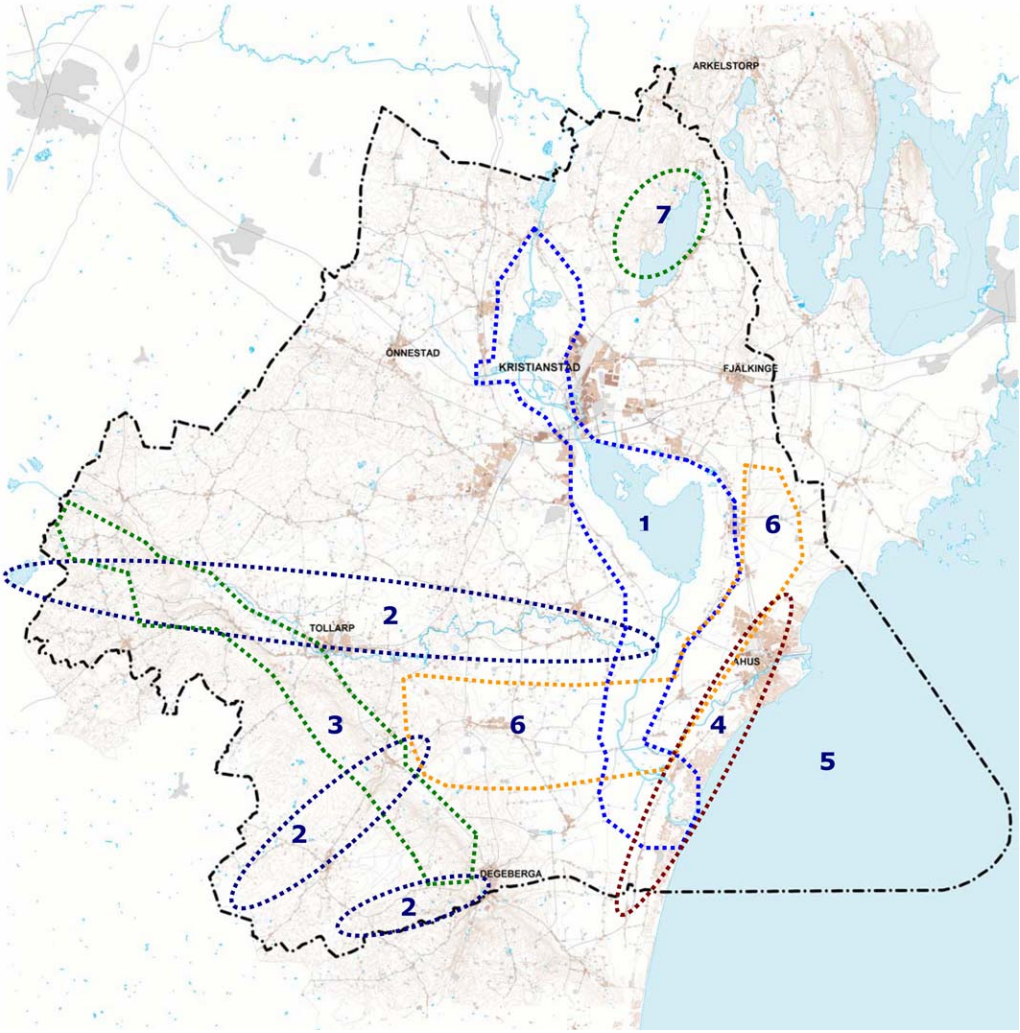
**Lichens**
No lichen species that are globally red-listed or listed by the EU as threatened have been recorded in the proposed biosphere reserve. However, 38 nationally red-listed lichens have been observed. These include *Bacidia rosella*, *Biatora sphaeroides*, *Catinaria laureri*, *Lecanora glabrata*, *Ophegrapha vermicellifera* and *Pyrenula nitida*.

Species that depend largely on ancient oaks and that occur inside the proposed biosphere reserve include *Arthonia pruinata*, *Cliostomum corrugatum*, *Opegrapha illecebrosa* and *Schismatomma decolorans*. *Cyphelium trachyloides*, a species that is extremely rare in Sweden and, indeed, in Europe as a whole and which may be found on fence posts on sandy grazing land within the proposed biosphere reserve.

### 13.3. Conservation of genetic biodiversity:
[Indicate species or varieties of traditional or economic importance and their uses, e.g. for medicine, food production, etc.]

A wide range of local plant and animal varieties of economic importance to old rural farming communities is likely to have existed within the proposed biosphere reserve. However, most of these have disappeared as a result of the rationalisation of farming in the twentieth century. The Linderöd Pig is a "new" Swedish breed of pig that originates from a small herd on Linderödsåsen Ridge which, in turn, probably descended from an older breed, the "forest pig", but was crossed with wild boar and other stock in the 1950s. An early type of tobacco seed from Åhus is included in the Swedish National Programme for Plant Genetic Resources, an initiative to conserve old varieties of plants.

Little is currently known about genetic variation in wild flora and fauna.




***Map 17***
***Boundaries of the biosphere reserve and the ten theme areas:***

1. The rich wetlands along the River Helge å
2. Tributaries of the River Helge å originating on Linderödsåsen Ridge
3. Rich woods and forest on the slopes of Linderödsåsen Ridge
4. The coastal landscape with extensive sand dunes
5. The coastal waters of Hanöbukten Bay
6. Sandy grasslands formerly managed under a rotational system of cultivation and fallow
7. Balsberget Hill and Lake Råbelövssjön

*not marked on map*
8. Ancient trees and wooded habitats in cultivated areas
9. Urban natural values
10. Groundwater

## 14. DEVELOPMENT FUNCTION

### 14.1. Potential for fostering economic and human development which is socio-culturally and ecologically sustainable:

[Describe how the area has potential to serve as a pilot site for promoting the sustainable development of its region or "eco-region".]

A number of sustainable development projects are already being carried out within the proposed biosphere reserve by the Municipality of Kristianstad, farming organisations, voluntary groups and others. As a result, the municipality is widely regarded to be a model of excellence and delegations from other municipalities, regional and national authorities within Sweden, as well as those from other countries, visit the area to learn about working methods and experiences.

Some of these projects, which demonstrate the breadth and potential that the proposed biosphere reserve has to serve as a pilot site for sustainable development, are presented below together with other factors that underpin this potential.

When the Ecomuseum Kristianstads Vattenrike opened in 1989 its overriding aim was to treat the water in the region as a resource, conserving the values associated with the water at the same time as it carefully utilised them to promote development. Since then the work of fostering sustainable development linked specifically to the water resources in the area has progressed on many fronts. Parallel with projects for sustainable development, a number of Ecomuseum visitor sites have been built in order to communicate via demonstration facilities and outdoor museums on site in the wetlands themselves the values of the local aquatic environment, the threats it faces and the opportunities that exist to preserve, develop and expand these values.

**Background**

Many factors contribute to the great potential the area possesses to promote economic and social development that is socio-culturally and ecologically sustainable, and which therefore makes the area appropriate as a pilot site for the region.

***Location***

The proposed biosphere reserve is an area that possesses great natural values both from a national and an international perspective at the same time as it is located adjacent to an expansive region with large population centres. It is situated in the Öresund region, which has the Danish capital, Copenhagen, on one side of the Öresund Strait and the Swedish cities of Malmö, Lund, Landskrona and Helsingborg on the other. Since the opening of the Öresund Link (a combined road/rail bridge and tunnel) in 2000, large numbers of people are now just a couple of hours' journey away from Kristianstad. The good environment is highly rated by companies that are contemplating establishing operations in the region, not least those in the food industry.

The proposed biosphere reserve contains a number of habitat/land cover types that impact on one another and interact with one another in different ways. This provides good opportunities within a clearly defined area for analysing how land use in one locality affects that in another, for example the impact of forests, agriculture or urban areas on freshwater and marine environments.

***Education, research and information***
With some ten universities and university colleges attended by more than 100,000 students, the Öresund region has access to substantial resources in the field of research. Kristianstad University, with 9,200 students, is part of the Øresund University network that links 14 educational and research institutions in the region, including Lund University, Malmö University and the University of Copenhagen.

Kristianstad University offers a number of courses related to conservation and sustainable use via, for instance, its Biology, Landscape Science and Ecological Engineering/Water Management programmes. The university is centrally located in the proposed biosphere reserve, adjacent to the Ramsar Convention site in the northern part of urban Kristianstad. Also linked to the university is the Krinova Science Park, a technology park specialising in environmental technology and education that works to promote fruitful co-operation between science, education and business. One of the business networks that operates via Krinova is Environmental Technology and Management, whose members include companies focused on sustainable development in the fields of environmental engineering and environmental certification.

The Centre for Transdisciplinary Environmental Research (CTM) at Stockholm University conducts research in the proposed biosphere reserve, co-ordinating a number of studies in Kristianstads Vattenrike. These studies are part of the UN-supported Millennium Ecosystem Assessment programme and involve close co-operation with the Resilience Alliance and the Beijer Institute. Access to the knowledge and the research networks that the proposed biosphere reserve stands to gain through these various initiatives represents a highly significant resource and a great potential.

A number of upper-secondary schools, including the colleges specialising in agriculture at Önnestad and forestry at Osby, combine theory and practical experience in the courses they offer. Kristianstads Vattenrike collaborates with these colleges with regard to field trips, work experience schemes, etc. Together with Önnestad it also shares responsibility for the management of demonstration facilities for the restoration of watercourses.

**Potential – operational approach in the core area and buffer zones of the wetlands**
Since 1989 the activities of Kristianstads Vattenrike have focused primarily on the wetland area within the Ramsar Convention site. The Ramsar Convention site consists of core areas surrounded by buffer zones. Our two-pronged operational approach of conservation and careful utilisation is demonstrated by two concrete examples: the “Hay from seasonally inundated grasslands” project and ecotourism. These projects serve as examples of our operational approach to future themes in the biosphere reserve, for instance the sandy grasslands or the valuable forest environments on Linderödsåsen Ridge.

In 2002 Kristianstads Vattenrike received the Swedish Species Information Centre’s prize for its work in combining the conservation of biodiversity in wetland areas with improved public access to these areas and utilisation of the values that exist there.

***Hay from seasonally inundated grasslands***
The great biological values present on seasonally inundated grasslands are the result of human management of these meadows for grazing and haymaking over the course of many centuries. Only by active management of the seasonally inundated grasslands can these values be preserved. For a number of years Kristianstads Vattenrike has been working with a local

agricultural company that owns areas of seasonally inundated grassland to develop equipment and devise ways of using mown grass from low-lying tracts of land in the wetland area. This initiative has received financial support both from the WWF and from a local investment programme for sustainable development (LIP), as well as from other sources. In recent years this collaboration has begun to yield some positive benefits:
– The market for hay from the meadows has increased and the hay is now increasingly widely used for horse feed.
– The equipment developed as part of the project has also begun to be used for the restoration of hay meadows and grazing land in other areas inside and outside the wetland area. The County Administrative Board has approved funds to permit the restoration of more than 100 hectares of seasonally inundated grasslands that are being encroached by vegetation.
– More staff have been employed and an effective method has been developed to manage hay meadows in order to preserve and restore their biological values.

***Ecotourism***
The proposed biosphere reserve offers excellent conditions for developing ecotourism in nature-related and culture-related contexts. Examples of potential activities include fishing, guided nature tours, guided cultural tours and boat hire. Seminars on ecotourism have been held to arouse interest and provide support for those involved. The provision of logistic support, know-how and ideas are key elements in this endeavour.

An EU project in landscape development with the focus on ecotourism is currently being run by a network of seven municipalities, including Kristianstad, in north-eastern Skåne (*Skåne Nordost*). As a result of this collaboration, work is now under way to establish a network of entrepreneurs interested in ecotourism. Interesting projects relating to ecotourism include angling, eel fishing, bed and breakfast hospitality and rural tourism.

**Potential – work in the transition area**
The transition area consists largely of the agricultural land and built-up areas on Kristianstadsslätten Plain. Here, too, there is great potential for promoting sustainable development through, for example, the extensive environmental work undertaken by the Municipality of Kristianstad as well as through projects in agriculture and forestry.

***The Municipality of Kristianstad's work for sustainable development***
The Municipality of Kristianstad has a track record of success with regard to environmental work and sustainable development. On 9 June 1998 the Municipal Council approved the adoption of three fundamental principles and a 12-point plan for sustainable development to be applied throughout all of the municipality's operations. The 12 points were based on the goals laid down by the Rio Conference and are an important statement of the municipality's intent to create "a region in ecological balance". The municipality is now involved in the work of formulating local environmental objectives based on Sweden's 15 national environmental quality objectives. These local objectives will define what we need to achieve within the next generation to create a good environment in Kristianstad.

The municipality has also adopted a number of other policies and declarations of intent. For example, in 1999 the Municipal Executive Committee declared that the municipality's long-term vision is an energy supply based on non-fossil fuels. In 2002 the Municipal Council adopted a waste management strategy that confirms the municipality's potential to work towards achieving its vision of providing "Sweden's best waste management". An energy

plan is currently being prepared, as is a climate strategy. Since 1998 there is an action plan for nature conservation within the Ramsar Convention site.

Using these strategies as a platform, a large number of investments have been made in the environment. Between 1998 and 2003 the Swedish government allocated SEK 7.2 billion to local investment programmes (LIPs) in a bid to accelerate the transition to an ecologically sustainable society. Kristianstad has been highly successful in this respect and is the only municipality in the country to receive grants for environmental investments on four occasions.

More than 30 LIP projects have been successfully implemented since 1998. These have been designed to:

* Replace fossil fuels with renewable energy
* Save energy
* Develop techniques for reducing eutrophication
* Improve waste management

Among these long-term efforts the management of organic waste is worthy of special attention, especially since large quantities of foodstuffs are handled in the Kristianstad region and the quantities of organic waste that are generated thus tend to be high. In this respect the establishment of a biogas plant in Karpalund has closed the cycle: organic waste from households, together with food industry waste and agricultural fertilisers is cofermented in the biogas plant, creating a closed ecosystem which generates sludge that can be returned to agricultural land and biogas that can be used as vehicle fuel and for district heating. According to plan, capacity will reach 44,000 MWh by 2006/2007 – equivalent to 4.4 million litres of fuel. At present, 9 GWh are used in Kristianstad as biogas for vehicles – equivalent to 900,000 litres of fuel.

Kristianstad has received several awards for its environmental work, including the European Commission's Campaign for Take Off Award 2001 ("Best Renewable Energy Partnership in Rural Communities"), the Climate Alliance's Climate Star 2002 and third prize in the Energy Globe Awards for 2003.

***Agriculture***

The proposed biosphere reserve includes the Kristianstadsslätten Plain, where the main agricultural activities today are the cultivation of sugar beet, potatoes and cereal crops, often in combination with the rearing of livestock. Pig-farming is one of the most important agricultural activities in the Municipality of Kristianstad, but there are also large numbers of cattle raised for milk and beef production.

Smaller farms are found in areas bordering the plain, such as the ridges. However, the problems associated with the use of pesticides and the leaching of nutrients into watercourses are a facet of both large and small-scale farming. Leaching creates risks for human health as well as impacting on both land and water.

Several initiatives have been launched to reduce nutrient losses to air and water, but major efforts are still required to stem the flow of nutrition elements into the Baltic Sea.

The option of converting from conventional agricultural techniques to organic production has hitherto been taken up chiefly by small farms. In the proposed biosphere reserve there are 22

farmers with an aggregate of just over 800 hectares of land under organic production, whose produce is certified in accordance with Swedish KRAV organic standards.

"Focus on Nutrients" is a project run jointly by the Swedish agricultural industry, the Swedish county administrative boards and the Swedish Board of Agriculture. The project, which seeks to reduce losses of nutrients to air and water from livestock and crop production, takes the form of a training and consultancy campaign, its name reflecting the aim it has to encompass the entire flow of nutrients on the farm. More than 150 farmers in the area are affiliated to the project.

Other initiatives include the *Skånskt Naturbeteskött* project ("Beef from natural pastures in Skåne"), which aims to conserve species-rich natural grazing land by labelling meat from natural pastures.

***Forestry***

The forests in the proposed biosphere reserve consist primarily of beech on the ridges, pine along the coastal strip and mixed woodland with beech, oak, pine and spruce in the northern areas. Most valuable among these are the beech woods on the north-eastern slopes of Linderödsåsen Ridge where several ravines have beech woods that resemble naturally regenerated forests with a long history of continuity and a large number of threatened and sensitive indigenous species. Some areas of forest in the proposed biosphere reserve are certified according to FSC or PEFC standards. In the Municipality of Kristianstad as a whole, some 1,250 hectares of forest owned by the Sydved Group and a further 16,800 hectares owned by the forestry group Södra skogsägarna are environmentally certified. As some smaller forest owners have also gained certification for their holdings, this means that at least 40% of the forests in the municipality are environmentally certified.

**Opportunities for future biosphere projects**

Kristianstad can rightfully be called the hub of the Swedish food industry since the concentration of food production and food processing in the area is greater than anywhere else in the country. In fact, "Spirit of Food" has been adopted as the main theme that the municipality has chosen to focus on when marketing and developing the Kristianstad region. In this connection water is also highlighted as one of the municipality's major resources.

Many of the biological values in the central areas of the proposed biosphere reserve are allied to the cultural landscape that has been characterised by centuries of cultivation and livestock farming. Preserving these values requires a strong agricultural sector with a market for what it produces.

These two approaches (the focus on food production and the role of agriculture in helping to preserve the region's biological values) are conflated in the various projects that can be undertaken within the proposed biosphere reserve to promote development at the same time as biodiversity is conserved. Some steps have already been taken: others remain to be tackled. Outlined below in point form are examples of some of the challenges facing the Kristianstads Vattenrike Biosphere Reserve in the future that relate not only to the conservation, but also to the development of values linked to food production and water in the region – challenges where we intend to take concrete action.

It is vital that the public, business and voluntary sectors continue to work together in order to achieve the best possible outcome for the proposed biosphere reserve.

– ***Beef from natural pastures:*** Improving awareness of the link between biodiversity, grazing animals and meat production by labelling the meat. Increased consumption of locally produced meat from cattle that have grazed on wet grasslands and other forms of natural pasture creates the right conditions for profitable livestock farming and therefore the conservation of biodiversity.
– ***Development of rural communities:*** the link between biodiversity, an attractive rural landscape and a healthy farming sector. Certain ancillary activities, such as the provision of accommodation, cultural and natural experiences, or food and drink, can help to make farming more economically viable. The role of the biosphere reserve is, for example, to help devise activities related to ecotourism and attract entrepreneurs and other stakeholders who are interested in providing such activities, in the form of local guides, hiking and cycle trails, fishing or "tourist packages", etc.
– ***Expand coastal tourism.*** Very large numbers of people visit the coast during the summer to swim and sunbathe. One future project is to broaden the range of coastal tourism so that those who travel here to spend time on the beaches also discover what the region has to offer further inland.
– ***Agricultural land.*** One challenge is to find new uses for farmland that enable ecological values and the values of the cultural landscape to coexist alongside social values in a way that is as economically viable as possible (for example, by the harvesting of wetland hay and alternative crops). Another challenge is to work with farmers and the support of research organisations to develop new irrigation techniques that reduce water consumption.
– ***Identify ecosystem services.*** The natural world of which we humans are a part provides us with a range of what are known as "ecosystem services". Examples include clean beaches, willows for pollinating insects, wetlands that serve as natural water purification plants and water level regulators, or any number of outdoor activities. The important challenge is to identify these ecosystem services in order to understand the need to conserve them and perhaps rehabilitate those that have disappeared or are on the verge of doing so.
– ***Conflict management – scenarios.*** As increasing numbers of people find their way to Kristianstads Vattenrike, many of them attracted by the natural surroundings and the opportunities that these offer for a wide range of leisure activities, the need to prevent conflicts arising with landowners and farmers will become greater and more urgent. Moreover, there are obvious risks of conflicts arising between recreational activities in terms of their different demands on and expectations of the environment. Conflicts may be prevented by identifying possible scenarios in advance.

### 14.2. If tourism is a major activity:
### - how many visitors come to the proposed Biosphere Reserve each year?
### - is there a trend towards increasing numbers of visitors? (Give some figures if possible)

The Swedish Tourist Authority's glossary (based on the WTO's Report "Recommendations on Tourism Statistics") defines a tourist as a person who visits places outside his/her usual home area either on a day trip or overnight. Records of tourist visits to Kristianstad in 2001 put the number of overnight stays in the municipality at 970,000, of which 450,000 were commercial overnight stays. Day trips totalled approximately 500,000. Measured as the number of overnight stays, accommodation with relatives and friends is the most commonly chosen option, followed by summer cottages and campsites. The long sandy beaches along the coast are the most popular destination for tourists to the municipality. Although there are no exact figures for the number of tourists who visit the beaches, it is estimated that a sunny day during the peak summer season attracts around 25,000 people to the seaside.

The proposed biosphere reserve is an important recreation area for people who live in the region, in terms of both leisure activities and nature-related pastimes. This applies, for example, to the beaches mentioned above, but also to nature in and around built-up areas. From the centre of Kristianstad it is possible to walk along the banks of the River Helge å on boardwalks and paths, passing through reedbeds and willow thickets and out into open rich wetlands which possess very high natural values. The river and its environs are thus an indispensable part of the city's green infrastructure.

When considering visitor figures for the Ecomuseum Kristianstads Vattenrike (presented below) it is important to remember that the majority of visitors are local residents who use the area for nature-related leisure activities, recreation or lunchtime walks. No figures are available at present for how many "outside" visitors visit the Ecomuseum.

**Visitors to the Ecomuseum Kristianstads Vattenrike**
Most of the Ecomuseum visitor sites, which include information boards, birdwatching platforms and boardwalks, are located in the core area and buffer zone. Automatic counters using photoelectric cells have been installed at eight of these sites to record visitor numbers. With the help of these records, and allowing for the fact that counters are not installed at some locations, we now know the Ecomuseum receives approximately 150,000 visits per year. The Wetland Boat Sightseeing company carries 4,000–8,000 passengers a year on its trips along the River Helge å.

**- Is there any discernible trend of rising visitor numbers? (please state numbers if possible)**

Estimates of inward tourism between 1992 and 2001 show that the number of commercial overnight stays (i.e. at hotels, campsites, youth hostels or in holiday cabins) has increased from just over 300,000 in 1992 to approximately 450,000 in 2001.

We also know from guiding and booking numbers that the number of outside visitors to the wetland area is increasing all the time. However, this has only a limited effect on overall visitor numbers as recorded by the counters at Ecomuseum sites over the past three years. This is because by far the greatest numbers of visitors are locals, who tend to make regular visits to the sites.

### 14.2.1. Type(s) of tourism
[Study of flora and fauna, recreation, camping, hiking, sailing, horse riding, fishing, hunting, skiing, etc.]

**Recreation and outdoor activities**
Not only is the proposed biosphere reserve important for inward tourism, it is at least as important as a recreational area for local people. Spending time in unspoilt natural surroundings (for example, picking berries and mushrooms, hunting, fishing, exercising and enjoying other outdoor pursuits) is a deeply rooted Swedish tradition. A large number of voluntary groups, organisations, clubs and associations use the proposed biosphere reserve for excursions and various types of social activity.

**Tourism**
Tourism is varied. The types of tourism linked to the water and other natural resources in the region include:

- Coastal tourism
- Nature activities: for example, birdwatching, berry and mushroom picking, picnics
- Activities arranged by clubs, societies, organisations, etc.
- Fishing
- Boating activities
- Hiking & cycling
- Orienteering
- Horse riding
- Camping
- Hunting

### 14.2.2. Tourist facilities and description of where these are located and in which zone of the proposed biosphere reserve:

Tourist facilities are present in all three zones.

In *the core areas* the only tourist facilities are those that contribute to the conservation goals, for instance by channelling visitors so as to reduce wear and tear, by providing visitors with information or by enhancing their overall experience of the local flora, fauna and landscape. Ecomuseum information facilities (information boards and outdoor museums) are located at four sites within the core area. There are also birdwatching platforms, boardwalks and other path systems to channel visitors. There are no facilities for overnight stays in the core area. The river excursion boats of the Wetland Boat Sightseeing company operate partly within the core area, giving visitors the opportunity to experience the significant natural values of the core area from the river.

A range of tourist facilities of similar character and function is provided in the *buffer zones*. The majority (six) of the Ecomuseum's information sites are located in these areas.
Parts of the coastal strip between Åhus and Yngsjö also fall within the buffer zone. This area, sometimes known as the "Eel Coast", constitutes an important part of the municipality's tourist profile, with the huts of the local eel fishermen scattered along the shoreline like a string of pearls. During the autumn some of the fishermen welcome visitors to "eel banquets" at which locally caught eels are served.
Two small campsites are also located in the buffer zone.

*The transition area,* which includes the surrounding rural and built-up areas, offers a wide range of accommodation, conference facilities, food and refreshment, art, theatres, etc. Three Ecomuseum visitor sites that provide information about the region are also located within the transition area.

The table below shows the tourist facilities in Kristianstads Vattenrike on a zone-by-zone basis.

| | **Core area** | **Buffer zone** | **Transition area** |
|---|---|---|---|
| **Ecomuseum visitor facilities with information** | 4 sites | 6 sites | 3 sites |
| **Accommodation** | 0 sites | 2 campsites | Many forms of accommodation, including<br>4 farms (B+B)<br>6 campsites<br>11 youth hostels |

| | | | |
|---|---|---|---|
| | | | 15 hotels |
| **Food and refreshments** | 0 sites | A limited number, mainly eel fishermen's huts | Wide variety |
| **Conference facilities** | 0 sites | 0 sites | 11 sites |

### 14.2.3. Indicate positive and/or negative impacts of tourism at present or foreseen:

**Positive effects** of tourism include the economic benefits that tourism brings to the area. The range of activities on offer increases, as do service levels in some areas thanks to improved public transport and a wider range of commercial services that make it more appealing for residents to continue to live in rural communities. Nature tourism also promotes greater awareness and insight into conservation. This knowledge and the changes in attitudes that it inspires foster the right kind of conditions for increased local involvement.

Tourism also improves the conditions for sustainable development through promoting fruitful collaboration between conservation, commercial and voluntary interests. Focusing on the unique natural features of an area provides a more solid platform from which to highlight the strengths of a rural community – not least to the people living there – and increases the community's positive exposure to nearby built-up areas.

Tourism also helps to inspire and consolidate new forms of partnership between public, voluntary and commercial interests, as well as generating increased participation from regional authorities, municipalities and organisations. Lastly, it provides opportunities to "snap up" new ideas and impulses for the biosphere reserve at local and regional level.

**Negative effects** of tourism include the risk of over-exploitation and degradation of terrestrial and aquatic environments and, as a consequence, the disturbance of sensitive flora and fauna. Measures are taken within the proposed biosphere reserve to channel visitors towards less sensitive areas by using boardwalks, paths and picnic areas where basic barbecue facilities are provided.

### 14.3. Benefits of economic activities to local people:

[Indicate for the activities described above whether the local communities derive any income or benefits directly or indirectly from the site proposed as a Biosphere Reserve and through what mechanism]

**Tourism**

No figures are available for the financial income generated by tourism within the proposed biosphere reserve. However, there are tourism reports for the Municipality of Kristianstad (the major part of which is inside the proposed biosphere reserve).

The latest figures are for 2001 and show that the travel and tourism industry in the municipality generated income slightly in excess of SEK 500 million and employed some 455 people.

| | Employment in 2001 (man-years) | Earnings in 2001 (SEK million) |
|---|---|---|
| Accommodation sector | 109 | 91 |
| Food sector | 27 | 57 |
| Restaurant sector | 114 | 121 |
| Transport sector | 31 | 103 |
| Retail sector | 54 | 109 |
| Leisure activities | 36 | 27 |
| Administration | 9 | |
| | | |
| Total | Man-years: 380 *<br>Annual full-time equivalents: 455 | Turnover: SEK 508 million |

* The term "man-year" is used here as a unit signifying the maximum amount of work that one person can do when working full-time throughout the year, based on a standard number of man-days. After allowance for illness etc. the figure of 380 man-years is estimated to correspond to approximately 455 annual full-time equivalents

**Ecosystem services**

The flora, fauna and landscape in the biosphere reserve provide a number of essential environmental services known as "ecosystem services". These are processes by which the environment itself produces resources and effects that we often take for granted: these include the role of wetlands as nitrogen sinks and the way that seasonally inundated areas both ensure that the hay meadows are naturally fertilised and help to reduce the risk of floods in urban Kristianstad. Other ecosystem services that nature provides us with are food production, biodiversity, opportunities for recreation, experiences of nature and aesthetic pleasure. These services have not yet been fully identified nor assigned a financial value.

**Examples of new commercial initiatives linked to water/nature/the environment**

The following are among the examples of activities that have been started in recent years and which are linked to the area's natural values or to work to improve the environment:

- The River Helge å Fishery Conservation Area generates SEK 350,000 annually through the sale of fishing permits.
- The Wetland Boat Sightseeing company has operated regular boat excursions on the River Helge å since 1994 and carries 4,000–8,000 visitors each year.
- At least 10 new permanent jobs in areas such as biogas management, district heating, the production of fuel straw for district heating plants, and wetland haymaking have been created as spin-offs from the municipality's environmental initiatives.

This highlights the potential for generating revenue within the framework of the proposed biosphere reserve and the municipality's strategy to position the area as a centre for food and food production by making full use of the natural prerequisites of the area in such a way that the natural values can be both enjoyed and conserved.

## 15. LOGISTIC SUPPORT FUNCTION

### 15.1. Research and monitoring

Research within the proposed biosphere reserve has been conducted in several different fields over a long period of time and with varying degrees of intensity. Previous research projects from the late nineteenth century up to 2003 have generally been pursued independently of each other even within the same field, but it seems likely that the establishment of a biosphere reserve will facilitate co-ordination and promote collaboration within and between different disciplines. Kristianstad University will play an important role in this process. As a first step towards establishing a future research committee linked to the biosphere reserve, the university has assigned a member of staff to be responsible for compiling a synthesis of previous and current research to support this application.

Environmental monitoring has been carried out over a long period. From an international point of view Sweden's system of long-term, regular environmental monitoring is relatively well developed, with time series measurements that in many cases are unequalled in other parts of the world. Environmental monitoring activities that receive state support are co-ordinated by the Swedish Environmental Protection Agency and are divided into ten separate programme areas defined according to specific environments such as Freshwater, Agriculture, Wetlands or Forests. In addition to environmental monitoring carried out by government authorities, many important research projects are undertaken under the auspices of other bodies, such as municipalities, water conservation associations, universities or voluntary organisations.

As part of the work of acquiring a better overview of environmental monitoring activities within the proposed biosphere reserve, the County Administrative Board of Skåne has initiated a comprehensive scheme for collating all monitoring. The list is, as yet, incomplete, but even at this stage it comprises more than 450 sites included in some form of environmental monitoring within the proposed biosphere reserve. As Swedish environmental monitoring is undertaken according to programme areas, with both abiotic and biotic monitoring in each area, the lists of studies presented here are by no means exhaustive. A more complete description based on the individual programme areas may be found in Appendix 8.

The compilation below has been divided into research and environmental monitoring. Long-term recurrent projects to document the state of the environment and any changes occurring in this are listed under "environmental monitoring". Data may be unpublished. The heading "research" includes published material under one of the following categories:

- Recognised, refereed scientific publications
- Recognised, non-refereed scientific publications, for example the proceedings of symposia, and books
- Other literature of scientific interest. This includes environmental documentation not included under the "environmental monitoring" heading.

#### 15.1.1. To what extent has the past and planned research and monitoring programme been designed to address specific management questions in the potential biosphere reserve? (For example, to identify areas needing strict protection as core areas, or to determine causes of and means to halt soil erosion, etc.)

No scientific research directly linked to management questions has been carried out, but a

large number of basic inventories and documentations have been produced by different state and regional authorities as well as by voluntary organisations. Recently many of these have been initiated and coordinated by the Municipality of Kristianstad and carried out in collaboration with government authorities and organisations (e.g. WWF and local voluntary groups).
Some examples of such documentation, produced specifically to be able to address management questions within the proposed biosphere reserve, have formed the basis for physical planning, environmental and nature conservation, groundwater abstractions, etc.

### 15.1.2. Brief description of <u>past</u> research and/or monitoring activities

[Indicate the dates of these activities and extent to which the research and monitoring programmes are of local/national importance and/or of international importance.]

Research of international importance comprises chiefly materials published in recognised, refereed scientific publications and materials published in the proceedings of international symposia.

Environmental monitoring of international importance includes:

1 monitoring where data is sent to and included in syntheses at an international level
2 monitoring where the measuring programme provides an indicator of the international environmental status.

This category also includes large-scale projects at a national level, used internationally to describe circumstances in Sweden, as well as meteorological observations.
All other environmental monitoring is of local/national importance in our documentation.

#### • Abiotic research and monitoring

[climatology, hydrology, geomorphology, etc.]

**Abiotic research and environmental monitoring of international importance**

***Abiotic research of international importance***

Abiotic research of international importance is concerned primarily with geological processes and phenomena, and it dates from the late nineteenth century onwards. It includes, for example:

– Descriptions of Pre-Quaternary geomorphology and weathering
– Descriptions of the composition and extent of Cretaceous strata
– Descriptions of deglaciation processes and the formation of glacial, glaciofluvial and glaciolacustrine land forms
– Local dating of the ice recession with the aid of clay-varve chronology and links to the Swedish time scale
– Descriptions of transgressions and regressions in relation to variations in water levels in the Baltic Sea and its precursors
– A number of documentations of the groundwater aquifers of Kristianstadsslätten Plain, which is Sweden's largest groundwater reservoir. These works describe the extent of the groundwater reservoir, the formation of the groundwater, the quality of the groundwater and monitoring and conservation aspects.

***Abiotic environmental monitoring of international importance***

Abiotic environmental monitoring of international importance includes:

– Measurements of air pollution since 1996 (*Skånes Luftvårdsförbund*, "The Skåne Air Quality Association")

– Measurements of metal content in Mountain Fern Moss *(Hylocomium splendens*) since 1968 (Swedish Environmental Protection Agency)
– Flow measurements in the River Helge å since 1908 (Swedish Meteorological and Hydrological Institute)
– Measurements of nutrients in the River Helge å within the national programme "Freshwater" since 1969 (Swedish Environmental Protection Agency)
– The quality of bathing water at bathing places along the coast and on lakes – the EU Bathing Water Directive – since 1995 (Municipality of Kristianstad)
– Meteorological observations since 1878 (Swedish Meteorological and Hydrological Institute).

**Abiotic research and environmental monitoring of national importance**

***Abiotic research of national importance***
Abiotic research of national importance includes:
– Surveys of soils and bedrock, subsequently published as map-sheets and commentaries on map-sheets
– Descriptions of groundwater resources and opportunities for abstractions within the Municipality of Kristianstad
– Studies and mapping of ground geochemistry as well as ores and industrial minerals
– Description and study of sand movements and dune formation which took place in historical time in coastal areas
– Forecasts and estimates of water levels in the River Helge å and Lake Hammarsjön
– Inventories of natural gravel and alternative materials
– Descriptions of the occurrence of ground radon, aluminium in lakes, and hormonal effects in the River Vramsån
– General analyses and studies of the environmental situation
– Studies of ground cadmium, cadmium in soils and crops, and petroleum hydrocarbonates in the River Helge å.

***Abiotic environmental monitoring of national importance***
Abiotic environmental monitoring of national importance includes:
– Measurements of air quality within what is known as the *Urban-nätet* project ("The Swedish Urban Air Quality Network") at two sites since 1989 (the Municipality of Kristianstad and the Swedish Environmental Research Institute [IVL])
– Groundwater quality and levels since 1968 (Geological Survey of Sweden)
– Measurements of water chemistry and studies of sediments in a large number of watercourses and lakes in the River Helge å's drainage basin. Many of the studies comprise 30-year time series. (Several participants and research programmes: *Helgeåkommittén* ["The River Helge å Water Conservation Association"], the Municipality of Kristianstad, the County Administrative Board of Skåne and the Swedish Environmental Protection Agency)
– Measurements of nitrogen compounds in groundwater at approximately 30 sites since 1989 (Municipality of Kristianstad)
– Soil samples in forested areas within the National Forest Inventory at 13 sites since 1993 (Swedish Environmental Protection Agency)
– Measurements of groundwater chemistry, surface water chemistry and water flow on agricultural land since 1974 (Swedish Environmental Protection Agency)
– Measurements of environmental toxins in bottom sediments and mussels, as well as hydrography (*Västra Hanöbuktens Vattenvårdsförbund* ["Western Hanöbukten Bay Water Conservation Association"]).

**● Biotic research and monitoring:**
[flora, fauna, etc.]

**Biotic research and environmental monitoring of international importance**

***Biotic research of international importance***
Palaeontology formed the main focus for early research, but in recent years biotic studies of international importance have also been undertaken in other disciplines, for example, population dynamics.
Biotic research of international importance includes:
– Comprehensive studies of different groups of Cretaceous organisms, for example, belemnites, ammonites, rudists, cephalopods, sharks, skates and algae.
– Studies of breeding ducks with regard to population dynamics, social structure and limiting resources.
– Studies of mussel shells as biomonitors.

***Biotic environmental monitoring of international importance***
Biotic environmental monitoring of international importance includes:
– Monitoring of bathing water according to the EU Bathing Water Directive for coastal waters and lakes since 1995 (Municipality of Kristianstad)
– Regular censuses of geese since 1967 (Wetlands International through *Nordöstra Skånes Fågelklubb* ["The Bird Society of North-East Scania"])
– Bird censuses along standardised line transects as part of the Swedish Bird Monitoring Programme since 1996 (Swedish Environmental Protection Agency)
– Censuses of resting and wintering waterfowl since 1964 within the framework of the International Seabird Inventory (Swedish Environmental Protection Agency)
– Censuses of cranes resting during spring migration since 1998 (*Nordöstra Skånes Fågelklubb* ["The Bird Society of North-East Scania"])
– Inventory of damage to forests since 1995 as part of the international ICP Forest programme.

**Biotic research and environmental monitoring of national importance**

***Biotic research of national importance***
Very large numbers of documentations have been carried out during the twentieth century within biotic research of national importance, primarily of avian fauna and flora within the proposed biosphere reserve. Many of these documentations have been produced by voluntary groups. The following description is merely an overview of the more important fields. Biotic research of national importance includes:
– Comprehensive documentation of avian fauna in the wetland area since the mid-twentieth century.
– Descriptions of the flora in a large number of botanical articles.
– Descriptions and documentation of a large number of organism groups: for example, fish, mussels and snails, amphibians, demersal fauna, bats and dragonflies.
– Numerous descriptions in the field of nature conservation have been made since the 1960s. Recently these include, for example, the Inventory of Meadows and Pastures in Sweden, descriptions of the values of different forest environments and surveys of damage to the forests. In addition, there is also documentation on wet grasslands that examines the effect of traditional farmland management and the response to this management, and descriptions of numerous sites within the wetland area that have been written as a preliminary to the

establishment of nature reserves.

***Biotic environmental monitoring of national importance***
Biotic environmental monitoring of national importance includes:
– Inventories of breeding wetland birds since the mid-1950s (*Nordöstra Skånes Fågelklubb* ["The Bird Society of North-East Scania"], and others)
– Follow-up studies of birds in forest environments, agricultural environments and along watercourses, for example, through species watch programmes or specific assignments with time series that, in some cases, date back to the 1960s and 1970s (the Scanian Ornithological Society, the Municipality of Kristianstad)
– Studies of environmental toxins in marine fish (*Västra Hanöbuktens Vattenvårdsförbund* ["Western Hanöbukten Bay Water Conservation Association"])
– Studies of demersal fauna and the use of electrical fishing techniques in a number of the watercourses and lakes in the drainage basin of the River Helge å. Many of the studies have time series extending over approximately 30 years. (Several participants and research programmes: *Helgeåkommittén* ["The River Helge å Water Conservation Association"], the Municipality of Kristianstad, the County Administrative Board of Skåne and the Swedish Environmental Protection Agency)
– Follow-up studies of populations of some threatened species of plants, for example through species watch programmes since 1988 (the Municipality of Kristianstad, the County Administrative Board of Skåne and the Swedish Society for Nature Conservation)
– Censuses of numbers of River Pearl Mussel (*Margaritifera margaritifera*) since 1986 (the County Administrative Board of Skåne, the Municipality of Kristianstad)
– Inventories of Common Frog (*Rana temporaria*) and Moor Frog (*Rana arvalis*) at certain locations since 1990, and the Natterjack Toad (*Bufo calamita*) at 20 locations since 1989 (County Administrative Board of Skåne)
– Inventories of forested areas with regard to, for example, vegetation, forest damage, stand composition and site productivity as part of the Swedish National Forest Inventory, with data from as early as 1923 (Swedish Environmental Protection Agency)
– Inventories of bats since approximately 1980 (the County Administrative Board of Skåne, the Municipality of Kristianstad)
– Follow-up studies of the conditions for biological diversity, based on 5 x 5 kilometre landscape squares randomly positioned across the country as part of the National Inventory of Landscapes in Sweden (NILS), which commenced full-scale operations in 2003 (Swedish Environmental Protection Agency).

- **Socio-economic research**

[demography, economics, traditional knowledge, etc.]:

**Socio-economic research and environmental monitoring of international importance**

***Socio-economic research of international importance***
None.

***Socio-economic environmental monitoring of international importance***
None.

**Socio-economic research and environmental monitoring of national importance**

***Socio-economic research of national importance***
Socio-economic research of national importance includes:

– Comprehensive published studies on ancient monuments, on landscape conservation, on land use adjacent to villages, and on Hanöbukten Bay as a natural resource from an economic point of view.
– A very large fund of traditional knowledge is to be found in the archives and publications of the various local history societies in the region, the Kristianstad Agricultural Society and Kristianstad University.
– Statistics Sweden (SCB) is a central government authority for official statistics that collects and produces information in a great number of fields, with demographic data from 1749 onwards and agricultural statistics that stretch back to 1799.

***Socio-economic environmental monitoring of national importance***
Socio-economic environmental monitoring of national importance includes:
– Automated photo-cell enumeration of visitors, currently in operation at seven sites within the wetland area.

### 15.1.3. Brief description of <u>on-going</u> research and/or monitoring activities:

**● Abiotic research and monitoring**
[climatology, hydrology, geomorphology, etc.]

**Research**
The research project "*Tracing of leachate pollutants at treatment plants as a base for development of treatment and water quality control systems (LAQUA)*" is being conducted within the proposed biosphere reserve. The aim is to develop suitable technology for purifying leach water from landfill sites, and to develop and validate a method of quality control for persistent compounds in leach water from landfill sites. The research is financed by The Knowledge Foundation and administered by the Department of Technology at Kristianstad University.

**Environmental monitoring**
The environmental monitoring described in §15.1.2 is still ongoing. Only a few individual studies have been completed.

**● Biotic research and monitoring**
[flora, fauna, etc.]

**Research**
A large number of research projects are ongoing. A selection of these projects is described below:

"*Population regulation of dabbling ducks in a national and international perspective: experimental studies as a basis for management and hunting"*
The aim is to understand what factors determine population size in dabbling ducks such as Mallard, Teal and Widgeon. This is of interest within the discipline, but is also essential for wetland management decisions about hunting seasons and quotas. The project is financed by the Swedish Environmental Protection Agency and administered by the Department of Mathematics and Natural Science at Kristianstad University.

"*Integrating ecosystem function into river quality assessment and management*"
The project aims to develop and disseminate a methodology for assessing the functional component of ecological river quality status by determining the performance of a key

ecosystem-level process, in this case leaf litter decomposition. The project is financed by the European Commission Environment Programme and administered by the Department of Technology, Kristianstad University.

"*The River Helge å valley's natural and cultivated landscape in a long-term perspective*"
The aim is to adopt an integrated interdisciplinary approach to analyse, describe and explain processes of change in the natural and cultivated landscape. The project integrates the disciplines of History, Quaternary Geology and Palaeo-ecology. The project is financed by the Swedish Research Council and Kristianstad University, and is administered jointly by the Department of Humanities and Social Science and the Department of Mathematics and Natural Science at Kristianstad University.

*"Pupils' learning about ecosystems"*
The aim is to develop an understanding of how pupils assimilate knowledge about the sometimes complex interrelationships within ecology. The project comprises analyses both of learning situations and the pupils' own reflections on their learning. The research project examines different ecosystems in the proposed biosphere reserve. The focus is on biology education, with pupils and university students as the primary target groups. The research has links with the Swedish National Graduate School in Science and Technology Education Research at Linköping University in collaboration with Kristianstad University.

**Environmental monitoring**
The environmental monitoring described under §15.1.2 is still ongoing. Only a few individual studies have been completed.

A new inventory is being conducted between 2002 and 2004. This inventory of meadows and pastures is a follow-up project by the Swedish Board of Agriculture to monitor what has been happening in Sweden's natural fodder-producing areas over the past 10 to 15 years, particularly with regard to the impact of environmental subsidies.

- **Socio-economic research**

[demography, economics, traditional knowledge, etc.]:

**Research**
The Centre for Transdisciplinary Environmental Research (CTM) at Stockholm University is co-ordinating a large number of studies in Kristianstads Vattenrike and the River Helge å drainage basin. The studies are included in the UN-supported programme Millennium Ecosystem Assessment, and close collaboration is maintained with the Department of Systems Ecology at Stockholm University, the Resilience Alliance, the Beijer Institute and the Stockholm Environment Institute.
The research is divided into a number of projects which will focus on the history and development of Kristianstads Vattenrike, its social and ecological capacity, its functional dynamics and what can change it in the future. The basis for this work is a number of fundamental theories concerning the importance of resilience for socio-economic development. The overarching goal, in accordance with the Millennium Ecosystem Assessment, is to reinforce the capacity to manage and administer ecosystems in a sustainable way in order to safeguard both the well-being of humanity and sound socio-economic development. Which ecosystem services do the natural systems generate? What does the ecosystem capacity consist of, and how does it function? How has the ecosystem management programme arisen, and how are the ecosystems maintained? Who is involved in the management and administration of the ecosystems? What can change the capacity of the

ecosystems and the administration of the ecosystems? What are the driving forces?

"*Biological diversity from the general public's perspective"*
The overarching aim of the project is to adopt an environmental-psychological perspective to study the attitude of the general public and other stakeholders towards the conservation of biological diversity within their immediate environment. The project will also cast light on the importance of various (psychological) motives for protecting the diversity. The project is financed by the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS) and administered by the Department of Architecture at the University of Lund.

*"The River Helge å Valley and Mankind – strategies over time and changes in the landscape."*
The aim here is to describe and discuss the ways in which various human strategies have affected and changed local society and the local cultural landscape over an extended period of time. Such strategies are founded not only on economic criteria, but may also include a social, political or even religious aspect. The main point of departure is provided by archaeological, cultural-geographical, historical or biological source materials. The project, which is administered by the Regional Museum in Kristianstad and financed continually together with a number of partners, serves as an "umbrella" for a variety of research initiatives.

### 15.1.4. Brief description of planned research and/or monitoring activities

Over the coming years new environmental monitoring procedures in Sweden will complement existing systems. These will be introduced partly to meet the requirements for EU member states to follow up conditions at, for example, Natura 2000 sites, and partly to follow up Sweden's 15 national environmental quality objectives.
In broad terms, much of the existing environmental monitoring structure will remain, but this will be complemented and adapted to meet the types of focus described above.

Locally within the proposed biosphere reserve, the compilation of existing environmental monitoring work now being undertaken by the County Administrative Board of Skåne will provide an important base for the ongoing work. As a further step towards improving current insights into these issues and making the information available to more people, there is a proposal to establish a "reference register" together with the County Administrative Board of Skåne and Kristianstad University. This register (preferably, a database with an Internet interface) should provide simple access to an overview of all the monitoring work that is being carried out. Another step is to carry out analyses of shortcomings in the current environmental monitoring processes, for example based on the theme areas that have been identified and that provide the foundation for ongoing work within the biosphere reserve. In this work we will identify needs and opportunities that exist for creating appropriate environmental monitoring activities both in the form of new environmental monitoring projects and through the integration of activities that are currently being carried out under the auspices of various national, regional, local and voluntary initiatives.

A research committee should be established in order to stimulate research, submit proposals for prioritised research areas and coordinate work in the biosphere reserve. Ideally this committee would comprise representatives of national research institutes, government bodies, local authorities and local business interests. The committee should have its administrative base at Kristianstad University.

The committee should also have overall editorial responsibility for an annual publication containing syntheses of relevant research carried out in the biosphere reserve.

**• Abiotic research and monitoring**
[climatology, hydrology, geomorphology, etc.]

The LAQUA project under §15.1.3 "Abiotic research" will continue at least until 2006. Large parts of the environmental monitoring described under §15.1.2 will continue.

**• Biotic research and monitoring:**
[flora, fauna, etc.]

All the projects under §15.1.3 "Biotic research" will continue at least until 2006.
The majority of the environmental monitoring described under §15.1.2 will continue.
This work will be complemented with follow-up studies into the conservation status of habitats and species within Natura 2000 sites in the proposed biosphere reserve.

**• Socio-economic research**
[demography, economics, traditional knowledge, etc.]:

A research project is being planned within the areas of Landscape Informatics and Virtual Reality. The aim of this project is to study and develop opportunities for creating Collaborative Virtual Reality Environments (CVEs) that enable two or more persons to meet in real time and interact in the same virtual landscape, despite their physical presence at different geographical locations in the real world. By combining VR and GIS technology, geographical data that are based on geology, vegetation, terrain and surrounding settlement patterns can be visualised in an Internet-published CVE. One particularly interesting area relates to the design problems that arise when socio-organisational aspects encounter technical limitations.

As part of the local follow-ups in the work on environmental targets certain socio-economic aspects will be monitored.

**15.1.5. Estimated number of <u>national</u> scientists participating in research within the proposed biosphere reserve on:**

- Full time basis: 2
- Part time basis: 17

**15.1.6. Estimated number of <u>foreign</u> scientists participating in research within the proposed Biosphere Reserve on:**

- Full time basis: 0
- Part time basis: 1

**15.1.7. Estimated number of masters and/or doctoral theses carried out on the proposed biosphere reserve each year:**

- 1 doctoral thesis
- 2 masters theses

### 15.1.8. Research station(s) within the proposed Biosphere Reserve:

[ 1 ] = permanent [ 0 ] = temporary

As Kristianstad University is located at the heart of the proposed biosphere reserve and in the immediate vicinity of the wetlands, no separate research station has been built. The functions of such a research station are already present on the university campus.
In 2002 the university had approximately 9,200 registered students. The staff totalled 463 full-time employees. The university is divided into six departments: Mathematics & Natural Science, Technology, Health Sciences, Economics, Behavioural Science, and Humanities & Social Science.

### 15.1.9. Permanent research station(s) outside the proposed Biosphere Reserve:

[If no permanent research station exists within the proposed Biosphere Reserve, indicate the location, distance to the core area, name and address of the most relevant research station]

- Lund University
- Malmö University
- Copenhagen University
- Øresund University. Kristianstad University is part of a unique cross-border consortium of 14 educational and research institutes in southern Sweden and Denmark that together form Øresund University.

### 15.1.10. Permanent monitoring plots

[Indicate the year established, the objective of monitoring, the type and frequency of observations and measurements, and whether an internationally recognized protocol is being used, for example the Smithsonian-MAB MAPMON protocol for monitoring forest biodiversity]:
There are no permanent monitoring plots within the area.

### 15.1.11. Research facilities of research station(s)

[Meteorological and/or hydrological station, experimental plots, laboratory, computerized databases, Geographical Information System, library, vehicles, etc.]:

Kristianstad University has modern, well-equipped laboratories for inorganic chemistry, organic chemistry, cell biology, microbiology, ecology, geo-science, environmental technology and geo-technology. Furthermore, the university also possesses a wide array of biological, environmental engineering, geo-technical and geo-scientific field equipment.
The university owns four boats and a four-wheel drive jeep.
The university library receives 240,000 visits a year and issues approximately 160,000 loans. Reading rooms and computer rooms are open 24 hours a day. The library has access to most of the major research databases.

Further resources are available through the Municipality of Kristianstad and the Ecomuseum in the form of reference libraries, boats and vehicles. Meteorological data from the on-line weather station is regularly made available to researchers.

### 15.1.12. Other facilities

[e.g. facilities for lodging or for overnight accommodation for scientists etc.]:

Eight rooms of high standard for overnight stays are available at Kristianstad University. In addition, Kristianstad itself has plentiful accommodation at different price levels in the middle of the proposed biosphere reserve.

### 15.1.13. Does the proposed biosphere reserve have an Internet connection?

The proposed biosphere reserve began to make use of the Internet at an early stage as a tool for information and communication, initially with schoolchildren as the target group. Since 1996 there has been a comprehensive website with around 500 pages, two web cameras and an Internet weather station. The address is www.vattenriket.kristianstad.se

## 15.2. Environmental education and public awareness

[Environmental education – sometimes now referred to as education for sustainable development – can be aimed at schoolchildren, the adult population of the local communities, and visitors from home and abroad].

### 15.2.1. Describe environmental education and public awareness activities, indicating the target group(s):

There are many examples of activities in environmental education and social information in the proposed biosphere reserve. These include not only the range of courses offered by the University, but also the Krinova Science Park, environmental work carried on by different firms and agricultural organisations, and lectures and excursions offered by voluntary organisations to their members and the general public. Many local environmental education activities are run by the Municipality of Kristianstad. A large number of municipal offices and services function as key resources and work actively with environmental education and information.

Examples include:

**Ecomuseum Kristianstads Vattenrike**

Public access to the proposed biosphere reserve is facilitated through Ecomuseum Kristianstads Vattenrike, which was established in 1989. According to an international model, the Ecomuseum comprises both the surrounding landscape and selected buildings and flora. The various Ecomuseum sites throughout the wetlands describe the links between the surrounding nature and the region's culture and history, at the same time as they also demonstrate local natural values and the threats that exist to those values. The theme of the Ecomuseum in Kristianstads Vattenrike is water. The museum comprises 40 interesting sites in the rich wetlands of Kristianstad, all in some way linked to water: bird observation towers, boardwalks, a river excursion boat and 13 visitor sites with information in the form of outdoor museums or informative displays on panels and boards. The Ecomuseum in Kristianstads Vattenrike is a member of the International Council of Museums (ICOM).

The Ecomuseum has great importance for public health and general education in that the sites are visited annually by approximately 150,000 people. These visitors include many school classes, researchers and foreign visitors, but the bulk of visitors are local residents. A large number of factual booklets have been produced to complement the information available at the Ecomuseum visitor sites, and there is also a comprehensive website with maps, pictures and texts as well as meteorological data online.

**The Ecomobile, Kristianstad Nature School**

The Nature School, also established in 1989, acts as an extension of the Ecomuseum in schools. The Nature School's target group is teachers at schools and preschool facilities and pupils in compulsory school and upper secondary school. The Nature School has two specially trained teachers and a minibus equipped with basic field equipment. Working in the immediate vicinity of local schools, the aim is to get teachers and schoolchildren to use the outdoor environment as a classroom. The keywords for this project are "Experience – Discover – Study".

As a complement to the schoolchildren's visits to natural environments close to the schools they attend, the Nature School has also produced boxes of teaching materials which are available at five locations in Kristianstads Vattenrike. These educational materials enable a large number of teachers to study nature and culture on site in the proposed biosphere reserve together with their pupils. One example is the teaching materials box at the popular *Canal House Outdoor Museum* which contains field equipment for studying life below the surface of the water in the River Helge å. It is used annually by about 30 classes, together totalling almost 1,000 pupils. Since 1996 the Nature School has expanded its activities in accordance with the maxim "First Outdoors, then IT". The basis for the programme is first-hand experience of nature outdoors, but interest is stimulated and maintained by the use of a digital camera, homepages and the opportunity of reporting (for example, "signs of spring") interactively on Kristianstads Vattenrike's homepage from the classroom.

In August 2002 the Nature School opened its first outdoor classroom in the rich wetlands of Kristianstads Vattenrike at Näsby fält. A second classroom opened in the autumn of 2003 at Balsberget Hill. The outdoor classrooms act as a focus and a forum for nature studies to which classes come to work with the Nature School on everything from ringing birds and learning about natural vegetable dyes to practical nature conservation work.

Another aspect of the comprehensive work of the Nature School is to supervise the environmental work of schools and nursery schools, together with Agenda 21. Thanks to these efforts, the Green Flag certification programme has been very successful. Of a total of almost 100 schools and preschool facilities in the municipality 43 are currently working towards Green Flag certification.

**Agenda 21 and the Environmental Health Services**
The Municipality of Kristianstad has been working with Agenda 21 since 1993 over a broad-based spectrum of activities. Young people constitute a special target group for Agenda 21, and one of the ways of establishing contact with this important segment is through an annual sports camp in which 700 young people learn about Agenda 21.

In collaboration with the municipal Department for Environment and Health and the Human Resources Office, Agenda 21 has worked internally within the Municipality of Kristianstad to carry out the municipality's most extensive educational project ever. All municipal employees have been offered environmental training. Each administrative unit within the municipality has its own environmental supervisor to train staff at their workplace. Together with the municipal Department for Environment and Health, Agenda 21 also works with the local community and companies, through lectures, exhibitions, seminars and "eco-breaks", which give companies from different branches of industry the opportunity to meet informally over a cup of coffee and exchange experiences or acquire information.

**Advisers**
As further evidence of the municipality's commitment to develop its activities along ecologically sustainable lines, an energy adviser is available in Kristianstad to provide information to the public, small businesses and organisations. The municipality also provides a consumer affairs adviser as part of its general service to the public.

### 15.2.2. Indicate facilities for environmental education and public awareness activities

[Visitors' centre; interpretative programmes for visitors and tourists; nature trails; ecomuseum demonstration projects on sustainable use of natural resources]

See §15.2.1

## 15.3. Specialist training

[Acquisition of professional skills by managers, university students, decision-makers etc.]

[Describe specialist training activities: for example research projects for students; professional training and workshops for scientists; professional training and workshops for resource managers and planners; extension services to local people; training for staff in protected area management]

Many officials from other municipalities, regional and national bodies visit the proposed biosphere reserve in order to familiarise themselves with different aspects of the work, such as the Ecomuseum, nature conservation, environmental work, or the activities of the Nature School. Students from a number of universities (Kristianstad, Lund, Stockholm, Helsingborg etc.) regularly visit the proposed biosphere reserve as part of their studies for a variety of courses, acquainting themselves with practical municipal nature conservation work or carrying out systematic, ecological studies of flora and fauna. Officials in different local government departments receive trainees from universities and colleges.

Workshops have been held for and together with, among others, the research group at the Department of Systems Ecology and the Centre for Transdisciplinary Environmental Research at Stockholm University. In September 2003 a major week-long workshop was held for a group of international researchers from the Resilience Alliance network.

## 15.4. Potential to contribute to the World Network of Biosphere Reserves

[Collaboration among biosphere reserves at a national, regional and global level in terms of exchange of scientific information, experience in conservation and sustainable use, study tours of personnel, joint seminars and workshops, Internet connections and discussion groups, etc.]

### 15.4.1. Collaboration with existing biosphere reserves at the national level (indicate on-going or planned activities):

Sweden has only one biosphere reserve: this is quite different in character and does not fulfil all the current criteria. Consequently Sweden has no previous experience of, or strategy for, how the work can be carried out on the basis of the Seville strategy. In view of this, since 2001 the Biosphere Candidate Office of Kristianstads Vattenrike has been intensively engaged, together with the Swedish Man and Biosphere Committee (MAB), in finding solutions suited to Swedish legislation (for example, for zonation). This has involved many working meetings with national authorities.
A handful of new areas in Sweden are also contemplating submitting applications for inclusion in the MAB programme. Through the Swedish MAB committee the Biosphere Candidate Office has met representatives of these areas on a number of occasions, for example during study visits to the proposed biosphere reserve.

### 15.4.2. Collaboration with existing biosphere reserves at the regional or subregional levels, including promoting transfrontier sites and twinning arrangements (indicate on-going or planned activities)

[Here, 'regional' refers to the regions as Africa, Arab region, Asia and Pacific Latin America and the Caribbean, Europe. Transfrontier biosphere reserves can be created by two or more contiguous countries to promote cooperation to conserve and sustainably use ecosystems which straddle the international boundaries. Twinning arrangements usually consist of agreements between sites located at some distance in different countries to promote activities such as cooperative research projects, cultural exchanges for schoolchildren and adults, etc.]

The Biosphere Candidate Office took part in the EuroMAB meeting in Rome in 2002 to present its work on protecting and developing the values in the wetland area close to the urban nucleus of the municipality. In conjunction with this, Finland and Norway together with Kristianstads Vattenrike from Sweden expressed a desire to establish a Nordic Man and Biosphere Network (NordMAB), which would act as an informal subsection of EuroMAB. The Baltic States, North-Western Russia, and, as and when appropriate, other countries in the region would also be included in NordMAB.
The Biosphere Candidate Office has also established contacts in Germany (for example, Schaalsee BR) and France (Vosges du Nord BR) to which highly rewarding visits were made in 2001 and 2002.

### 15.4.3. Collaboration with existing biosphere reserves in thematic networks at the regional or international levels (indicate ongoing and planned activities)

[Networks of sites which have a common geographic theme such as islands and archipelagoes, mountains, or grassland systems, or a common topic of interest such as ecotourism, ethnobiology etc.]

The towns of Kristianstad and Åhus lie within the proposed biosphere reserve. Inside and in close proximity to these towns there are already defined core areas and buffer zones; new ones will in all probability be established in the future. The Biosphere Candidate Office's work on the opportunities for conservation and development in relation to this urban landscape has attracted international attention, which is why the Biosphere Candidate Office now forms part of MAB's Urban Group. As part of the international conference "Life in the Urban Landscape" to be held in Sweden in 2005, an excursion is planned to the proposed biosphere reserve.

A Ramsar site extends from north to south through the proposed biosphere reserve. This Ramsar site runs right through the urban centre of Kristianstad. Over the years contacts have been established with representatives for a large number of Ramsar sites, of which several have been biosphere reserves. In the future the continued development of contacts with Ramsar sites which are also biosphere reserves would be of great interest.

Within several of the geographic theme areas defined as, for example, coastal and sea areas, small watercourses, sand areas, forest environments and groundwater, there are enormous opportunities to make worthwhile contacts with other biosphere reserves. There are also many experiences to share and to develop together with other biosphere reserves within functional themes: examples include ecotourism, research, information via the Ecomuseum and the Nature School, environmental monitoring, restoration work within natural and cultural history, and the development of products predicated on the preservation of valuable environments that provide a financial benefit to the local population.

### 15.4.4. Collaboration with existing biosphere reserves at the international level

(indicate ongoing and planned activities):
[Notably through Internet connections, twinning arrangements, bilateral collaborative research activities, etc.]

See answer above.

## 16. USES AND ACTIVITIES

### 16.1. Core area(s)

#### 16.1.1. Describe the uses and activities occurring within the core area(s):

[While the core area is intended to be strictly protected, certain activities and uses may be occurring or allowed, consistent with the conservation objectives of the core area]

The core areas within the proposed biosphere reserve consist in large part of lakes with adjacent wet grasslands, wet forests and waterside/shoreline forests. The great natural values of the wet grasslands are intimately and entirely associated with the use to which the land has been put over hundreds of years for haymaking and managed grazing. Apart from these areas, the core areas consist of, for example, running water, dry grasslands with areas of xeric sand calcareous grasslands, outfield pasture, areas of sand dunes, small forested areas and part of a raised bog.

Those activities and businesses being carried on within the core areas are:

- Haymaking and managed grazing
- Surface water abstraction for irrigation
- Lakes and watercourses as aquatic recipients
- Conservation-friendly forestry
- Military exercises
- Hunting and fishing
- Boating activities
- Harvesting aquatic vegetation
- Leisure and recreation
- Teaching
- Research and environmental monitoring
- Tourism

#### 16.1.2. Possible adverse effects on the core area(s) of uses or activities occurring within or outside the core area(s): (Indicate trends and give statistics if available)

One of the adverse effects on the core area comes from land use and activities being carried on outside the core area, and in many cases even outside the biosphere reserve. The water chemistry of the River Helge å is thus affected to a great extent by the three-quarters of the catchment area that lies upstream of the biosphere reserve. The land, which is boggy and heavily forested, releases water that is rich in humic acid, which means that the water in the River Helge å and the lakes is frequently deep brown in colour. Similarly, bird and fish populations, for example, are affected to a great extent by activities outside the biosphere reserve, through hunting, fishing and migration obstacles.

In this and the following accounts we have concentrated on the adverse effects that occur as a result of activities closer to the proposed reserve.

Examples of adverse effects on the core area:

– *vegetation encroachment in lake environments and on managed hay meadows and grazing land*
– *periodically insufficient water flow in minor watercourses*
– *eutrophication via water and air*
– *deterioration in transparency in aquatic environments as a result of raised levels of humic acid*
– *impact of environmental toxins via air and water.*

## 16.2. Buffer zone(s)

### 16.2.1. Describe the main land uses and economic activities in the buffer zone(s).

[Buffer zones may support a variety of uses which promote the multiple functions of a Biosphere Reserve while helping to ensure the protection and natural evolution of the core area(s)].

For the most part the buffer zones consist of private land and include, for example, forest, running water, lakes, areas of sand dunes, sea areas and agricultural land on the margins of valuable wet grasslands or forest areas.

Land use and activities carried on within the buffer zones include:

- Agriculture with cultivation, hay meadows and managed grazing
- Fruit growing
- Surface water abstraction for irrigation
- Lakes and watercourses as aquatic recipients
- Forestry
- Hunting and fishing
- Boating activities
- Leisure and recreation
- Teaching
- Research and environmental monitoring
- Tourism
- Transport and communication (roads and railways), as well as dispersed settlement

### 16.2.2. Possible adverse effects on the buffer zone(s) of uses or activities occurring within or outside the buffer zone(s) in the near and longer terms:

Examples of adverse effects on the buffer zone:
– *vegetation encroachment in lake environments and on managed hay meadows and grazing land*
– *periodically insufficient water flow in minor watercourses*
– *eutrophication via land, water and air*
– *silting up and deterioration in transparency in aquatic environments as a result of raised levels of humic acid*
– *impact of environmental toxins via air and water*
– *reduced biodiversity through intensive use of the land, e.g. for agriculture and forestry.*

## 16.3. Transition area

[The Seville Strategy gave increased emphasis to the transition area since this is the area where the key issues on environment and development of a given region are to be addressed. The transition area is by definition not delimited in space, but rather is changing in size according to the problems that arise over time. Describe briefly the transition area as envisaged at the time of nomination, the types of questions to be addressed there in the near and the longer terms. The size should be given only as an indication.]

### 16.3.1. Describe the main land uses and major economic activities in the transition area(s):

The transition area within the proposed biosphere reserve consists in large part of agricultural land, forest, villages and dispersed settlement.

Examples of land use and activities carried on in the transition area:

- Agriculture, dominated by cultivation
- Ground water abstraction for consumption, industry and irrigation
- Surface water abstraction for irrigation
- Forestry
- Shipping
- Hunting
- Leisure and recreation
- Teaching
- Research and environmental monitoring
- Tourism
- Transport and communication: roads, railways, airport and harbour
- Settlement
- Trade and industrial activity

### 16.3.2. Possible adverse effects of uses or activities on the transition area(s):

Examples of the adverse effects on the transition area of land use or other activities are:
*– eutrophication via land, water and air*
*– impact of environmental toxins via air and water*
*– reduced biodiversity through over-intensive use of the land, e.g. for agriculture and forestry, settlement and communications*
*– noise pollution caused by transport and communications*
*– changes in groundwater flows as a result of excessive abstraction of groundwater.*

## 17. INSTITUTIONAL ASPECTS

### 17.1. State, province, region or other administrative units:

[List in hierarchical order administrative division(s) in which the proposed Biosphere Reserve is located (e.g. state(s), counties, districts)]

State: Sweden

Province: Skåne

Region: Municipality of Kristianstad

### 17.2. Units of the proposed biosphere reserve:

[Indicate the name of the different land management units (as appropriate, e.g. protected area, territories of municipalities, private lands) making up the core area(s), the buffer zone(s) and the transition area).

**The core areas** consist of nature reserves, Natura 2000 sites and habitat protection areas.
**The buffer zones** consist of a Ramsar Convention site, areas of national interest for the purposes of nature conservation, shore protection areas, forests with nature conservation agreements, and municipally-owned or state-owned nature conservation areas with non-statutory protection.
**The transition area** consists of other types of land.

### 17.2.1. Are these units contiguous or are they separate?

[A biosphere reserve made up of several geographically separate units is called a "cluster biosphere reserve". Please state if this is the case of the proposal.]

These areas are contiguous. The core areas are surrounded for the most part by the buffer zones, which are surrounded in turn by the transition area.

### 17.3. Protection Regime of the core area(s) and, if appropriate of the buffer zone(s)

The zonation that will apply in the proposed Kristianstads Vattenrike biosphere reserve is not contingent on any new legislation, but is based exclusively on the provisions of the Swedish Environmental Code.

### 17.3.1. Core area(s):

[Indicate the type (e.g. under national legislation) and date since when the legal protection came into being and provide justifying documents (with English or French summary of the main features)

The core areas consist of nature reserves, Natura 2000 sites and habitat protection areas, all of which are afforded protection by Swedish legislation in accordance with the Environmental Code, which came into force on 1 January 1999. Documents that confirm the status of these areas are appended as Appendix 4.
The core area in the proposed biosphere reserve consists of 7,179 ha (7 % of the total area of the biosphere reserve), of which 1,855 ha are protected as nature reserves, 4,927 ha constitute Natura 2000 sites in accordance with the EU Habitat Directive (SCI) and 4,376 ha constitute Natura 2000 sites in accordance with the Birds Directive (SPA). Several of these areas are both Natura 2000 sites and nature reserves.

**Nature reserves**
Most of the regulations relating to the establishment of nature reserves are detailed in Chapter 7 of the Environmental Code and in *Förordningen om områdesskydd* ("The Ordinance concerning the Protection of Certain Areas"). A county administrative board or a municipality may declare an area of land or water a nature reserve for the purpose of preserving biological diversity, protecting and preserving valuable natural environments or satisfying the need of areas for outdoor recreation (Environmental Code, Chapter 7, section 4). Any area that is needed for the purpose of protecting, restoring or establishing valuable natural environments or habitats for species that are worthy of preservation may also be designated a nature reserve. A decision establishing a nature reserve shall specify any restrictions on the right to use the area, such as prohibitions against development, planting and the use of fertilisers and pesticides (Environmental Code, Chapter 7, section 5).

There are 14 nature reserves within the proposed biosphere reserve, with an aggregate area of 1,855 ha, which is equivalent to approximately 25% of the core area, or approximately 1.5% of the entire area of the biosphere reserve. Work to establish nature reserves is ongoing in a number of areas (Balsberget, 450 ha; Forsakar, 40 ha; Söndreklack, 30 ha; Egeside, 230 ha; Pulken-Yngsjön, 340 ha; and Västra Hammarsjön, 1,330 ha) totalling approximately 2,420 ha in all.

**Habitat protection areas**
Small land and water areas that are particularly important for endangered species or are otherwise worthy of protection may be designated habitat protection areas (in accordance with the provisions of the Environmental Code, Chapter 7, section 11). No activities or measures that are liable to damage the natural environment may be undertaken in habitat protection areas. The Regional Forestry Board has a responsibility to propose, delineate and reach a decision about habitat protection on forested land. The proposed biosphere reserve includes 12 forest habitat protection areas with a total area of 19 ha.

**Natura 2000 sites**
The Habitat Directive (SCI) and the Birds Directive (SPA) constitute the EU member states' community legislation in the area of nature conservation. These directives create a common framework for the protection of animals, plants and landscape types, and provide for a network of protected areas known as Natura 2000 sites. These areas are preserved "in order to maintain and restore, at favourable conservation status, natural habitats and species of wild fauna and flora of European Community interest". In Sweden, the areas are selected by the respective county administrative board and then reviewed by the Swedish Environmental Protection Agency. The Swedish government then reaches a decision on whether to propose to the EU Commission that the areas be incorporated in the Natura 2000 network. The Commission subsequently carries out a scientific examination of the selected areas and establishes biogeographical lists. Sites covered by the Birds Directive, however, do no need to undergo this procedure: in these instances the area is designated as a direct result of a decision made by the Swedish government.

Under the heading "Special protection areas" in Chapter 7, sections 28 and 29 of the Environmental Code is a description of how Natura 2000 sites are to be treated. Permission is required if anyone wishes to carry out activities or undertake measures which may have a significant impact on the environment in a Natura 2000 area. Pursuant to the terms of section 28 b, such permission may only be granted if the measure will not damage the natural habitat which the area is intended to protect, nor risk subjecting the species to be protected to such

disturbance that this may seriously compromise the conservation of one or more species in the area. As a result of this, the Natura 2000 sites in Sweden enjoy such strong protection in law that it is our opinion – and that of the Swedish Environmental Protection Agency – that they more than satisfy the criteria for core areas in accordance with the MAB programme.

The proposed biosphere reserve contains 34 areas protected by the Habitat Directive (SCI) with a total area of 4,927 ha and 4 areas protected by the Birds Directive (SPA) with a total area of 4,376 ha. Several of the areas are designated by both the Habitat Directive and the Birds Directive: the aggregate of these overlapping areas totals 6,844 ha, which constitutes 95 % of the core areas.

### 17.3.2. Buffer zone(s):

[Indicate the type (e.g. under national legislation) and date since when the legal protection came into being and provide justifying documents (with English or French summary of the main features. If the buffer zone does not have legal protection, indicate the regulations that apply for its management.)

**The buffer zones** in the proposed biosphere reserve cover an area of 22,900 ha. They consist of a Ramsar Convention site, areas of national interest for the purposes of nature conservation, shore protection areas, areas for which the state, through its agent the Regional Forestry Board, has signed long-term nature conservation agreements with landowners, and municipally-owned or state-owned nature conservation areas with non-statutory protection.

**Ramsar site**

The Convention of Wetlands (also known as the "Ramsar Convention") is an international agreement the original aim of which was to safeguard habitats for wetland birds. Since ratifying the convention in 1974 Sweden has designated 51 Ramsar sites in the country. Among the obligations associated with the signing of the Ramsar Convention is the requirement to "include wetland conservation considerations within national land-use planning". An 8,050 ha area along the River Helge å and around Lake Hammarsjön has been classified as a Ramsar site. Those areas of the Ramsar site that comprise nature reserves or Natura 2000 sites are included in the core area of the proposed biosphere reserve, while remaining areas form part of the buffer zones. At the same time, the entire Ramsar site is of national interest for the purposes of nature conservation and is consequently protected by the legislation described in the following paragraph.

**National interests**

In Sweden areas may be designated as being of national interest to society for a variety of reasons: for example, areas of national interest for nature conservation, outdoor recreation or as a cultural landscape, but also areas of national interest for commercial fishing, industrial production, energy production and communications. These national interests enjoy protection in Swedish law.

A decision has been made to classify as buffer zones in the proposed biosphere reserve areas that are designated as being of national interest for nature conservation, with one or two minor adjustments to take account of urban areas. Areas of national interest for nature conservation represent the salient features of the Swedish countryside and constitute the most valuable areas from a national perspective. These areas are selected by the Swedish Environmental Protection Agency in consultation with, among other bodies, the relevant county administrative board.

The Environmental Code (Chapters 3 and 4) stipulates that areas of national interest for nature conservation shall, to the extent possible, be protected against measures that may damage the

natural environment. These regulations, however, only have a direct effect when processing permit applications regarding development projects which, in the legal sense, involve a change in land use (for example, where forest land is replaced by urban settlement). If the land continues to be used in its current form, these regulations have only a consultative function.

In addition to the national interests selected by the Swedish Environmental Protection Agency and the relevant county administrative board, the legislation also mentions (Environmental Code, Chapter 4) a number of specific areas which possess such great natural and cultural values that they are "of national interest in their entirety". Development projects may only be undertaken in these areas where they can be implemented in a manner that does not significantly damage the natural and cultural values. Among the areas thus named is a fairly extensive stretch of coast and sea within the proposed biosphere reserve. Parts of this area have also been proposed for inclusion within the buffer zones around the biosphere reserve.

The aggregate surface area within the proposed biosphere reserve of areas that are of national interest for nature conservation and of national interest within the coastal zone is 28,250 ha. Parts of the areas of national interest have already been designated nature reserves or Natura 2000 sites and therefore form part of the core area.

**Shore protection areas**
In accordance with Chapter 7 in the Environmental Code shore protection applies by the sea, lakes and watercourses. The purpose of shore protection is to assure public access to outdoor recreation facilities and to maintain good living conditions for plant and animal species on land and in water. Within shore protection areas there are prohibitions against the erection of new buildings or the alteration of buildings in order to serve a purpose that is significantly different from that for which they were previously used. There are also prohibitions against digging, the erection of other structures or works, and other measures which significantly affect the living conditions of animal and plant species.

Certain watercourses within the proposed biosphere reserve have shore protection areas for areas of land and water up to 300 metres from the shoreline at normal mean water level, while most small watercourses are protected up to 100 metres from the shoreline on each bank. In all, the shore protection areas in the proposed biosphere reserve cover 10,670 ha. Parts of the shore protection areas have already been designated for protection as nature reserves or Natura 2000 sites and therefore form part of the core area.

**Municipally-owned nature conservation areas with non-statutory protection**
Around 20 sites covering a total of slightly more than 1,500 ha within the proposed biosphere reserve are owned and managed by the Municipality of Kristianstad and are included among the municipally-owned nature conservation and outdoor recreation areas with non-statutory protection. These are areas of high natural values and consist of meadows, grazing lands and forest land, which have been reserved for nature conservation and outdoor recreation in accordance with a decision of the municipal executive committee from 21 August 1996. Parts of these areas have already been designated as nature reserves or Natura 2000 sites and therefore form part of the core area.

**State-owned areas for nature conservation purposes**
These areas consist of land with high natural values that the Swedish Environmental Protection Agency has purchased on behalf of the state with the intention of designating as

nature reserves. A total of 1,050 ha in the proposed biosphere reserve consists of such state-owned nature conservation areas. Most have already been designated as Natura 2000 sites or nature reserves and therefore form part of the core area. A small 17-hectare parcel of land by the River Klintabäcken, currently designated as a nature conservation area with non-statutory protection, is, however, within the buffer zone.

**Forests with nature conservation agreements**
Nature conservation agreements for forests are voluntary agreements governed by civil law which are signed between the state, through its agent the Regional Forestry Board, and the forest owner with the purpose of conserving and developing the natural values of a forested area. Such agreements are normally signed for a duration of between 30 and 50 years. Within the proposed biosphere reserve three such nature conservation agreements have been signed to protect areas totalling 12 ha.

### 17.4. Land use regulations or agreements applicable to the transition area (if appropriate)

There are several laws, each subject to different procedures, that regulate the use of land in Sweden. As far as physical planning is concerned, construction and the exploitation of land and water resources are regulated by the Planning and Building Act. The content of these activities is governed the Swedish Environmental Code. A number of other laws and enactments of consequence to the use of land are also described in this section.

**Planning and Building Act (SFS 1987:10)**
The Planning and Building Act dates from 1987, with significant amendments in 1996 which invested overall responsibility for physical planning in the municipal authorities. The law regulates how the planning of available land and water resources in Sweden is to be undertaken and managed from the level of the municipal "comprehensive plan" down to the "detailed development plan". As far as physical planning is concerned, municipalities consider and determine the use to which different areas within the respective municipality may be put; for example, housing development, the preservation of the natural environment, or various types of commercial activities such as industry, trade and public communications.

The municipalities have a monopoly on planning the use of land and water resources and are responsible for maintaining a constantly updated comprehensive plan. This plan, which covers the entire municipality, serves as a long-term vision for municipal development with regard to the future utilisation of land and water resources. At the same time, the plan is also a vision for future housing development, new workplaces, infrastructure and green areas. The detailed development plans regulate, among other things, the use of land and the location and appearance of buildings. All planning work takes place as part of a broad-based and transparent process, which is conducted together with the general public, commercial companies, associations and the relevant authorities.

The current comprehensive plan for the Municipality of Kristianstad was approved in 1990 and subsequently complemented by detailed studies for Härlöv (1992), Täppet-Vanneberga in Åhus (1993), the coastal area (1997) and Åhus (2003). Plans have also been initiated for Önnestad. An update review has been produced to determine what is still appropriate and what needs to be complemented in the current comprehensive plan.

Work has also commenced to produce a new comprehensive plan for the Municipality of Kristianstad with a detailed study for the urban centre of Kristianstad.

**The Environmental Code (SFS 1998:808)**
The purpose of the Environmental Code is "to promote sustainable development which will assure a healthy and sound environment for present and future generations". This implies that nature is not merely a habitat for human beings, but also is worthy of protection in its own right.

The transition area includes areas that have already been designated as being of national interest for the cultural environment, outdoor recreation and commercial fishing. These areas are dealt with in Chapter 3 of the Environmental Code, where it is stated that such areas shall, to the extent possible, be protected against measures that may significantly damage them.

The Environmental Code also includes regulations that state that permission must be granted for all types of land drainage (Chapter 11), and for the quarrying of rock, stone, gravel, sand or other types of soil (Chapter 12). Furthermore, section 6 of chapter 12 also states that, even in the case of activities which do not require a permit, notice of consultation shall be made to the supervisory authority if operations risk substantially changing the natural environment.

The use that agricultural operations make of the land is regulated in part by the provisions of the Environmental Code and the *Förordningen om miljöhänsyn i jordbruket* ("The Ordinance concerning Environmental Concern in Agriculture"), which deal with issues such as animal husbandry, the management of manure, and the fact that, for example, 60% of the land must have plant cover in autumn and winter to reduce the leaching of nutrients.

A number of animal and plant species are protected (Environmental Code, Chapter 8). Protected animals may not be killed, injured or captured: protected plants may not be damaged or removed, and no part of the plant may be taken or collected. Some 300 species are protected in Sweden, including 45 species of orchid, 186 other vascular plants, 11 species of moss, 8 species of lichen, 5 species of fungi, 20 amphibians and reptiles, and 25 species of invertebrates. In addition to these species, all birds and mammals are protected in accordance with game legislation (with exceptions for a number of species during specified hunting seasons). Species that occur in the watercourses of Kristianstads Vattenrike and that are protected in accordance with the fishing legislation are European Catfish (*Silurus glanis*) Freshwater Pearl Mussel (*Margaritifera margaritifera*) and Thick-shelled River Mussel (*Unio crassus*).

**Other environmental legislation**
In addition to the Environmental Code and the Planning and Building Act, there are a great many other laws which are relevant in this connection.

The first paragraph of the Forestry Act (SFS 1979:429), which equates environmental objectives with production objectives, begins "The forest is a national resource. It shall be managed in such a way as to provide a valuable yield and at the same time preserve biodiversity". The text then goes on to regulate how felling is to be performed and what considerations must be taken. In the case of "selected valuable broadleaved trees" no felling may be carried out without permission, and "selected valuable broadleaved forests" may not be replaced by other forest after felling (§22–28)

Fishing and hunting are regulated in *Fiskelagen* ("The Fishing Act" SFS 1993:787) and *Jaktlagen* ("The Hunting Act" SFS 1987:259) respectively.

Other statutes which affect the use of land include the *Väglag* ("The Roads Act" SFS 1971:948) and *Lag om byggande av järnväg* ("The Act concerning the Building of Railways" SFS 1995:1649).

**Other forms of agreements**
Additionally, the use of land is governed by voluntary agreements and management agreements. This covers *inter alia* state environmental subsidies for agricultural land, for example for the conservation of grazing land and hay meadows, as well as various measures to reduce the leaching of nutrients, and nature conservation agreements for forested land. Moreover, various industries have reached their own agreements, such as those relating to forest certification (for example, FSC and PEFC) and to agricultural land reserved for ecological cultivation (for example, under the KRAV labelling system for organic produce).

### 17.5. Land tenure of each zone:
[Describe and give the relative percentage of ownership in terms of national, state/provincial, local government, private ownership, etc. for each zone.]

#### 17.5.1. Core area(s):

The core areas cover 7,179 ha
Municipal land: 1,571 ha = 25%
State-owned land: 1,864 ha = 28%
Other owners: 3,744 ha= 47%

#### 17.5.2. Buffer zone(s):

The buffer zones cover 22,900 ha
Municipal land: 762 ha = 3%
State-owned land: 197 ha = 1%
Other owners: 21,941 ha= 96 %

#### 17.5.3. Transition area(s):

The transition area covers 74,297 ha
Municipal land: 4,585ha = 6%
State-owned land: 1,748 ha = 2%
Other owners: 67,964 ha= 92%

#### 17.5.4. Foreseen changes in land tenure:
[Is there a land acquisition programme, e.g. to purchase private lands, or plans for privatization of state-owned lands?]

No changes in land tenure are foreseen.

### 17.6. Management plan or policy and mechanisms for implementation
[The Seville Strategy recommends promoting the management of each biosphere reserves essentially as a "pact" between the local community and society as a whole. Management should be open, evolving and adaptive. While the aim is to establish a process leading to elaborating a comprehensive management plan for the whole site reflecting these ideas and involving all stakeholders, this may not yet exist at the time of nomination. In this case however, it is necessary to indicate the main features of the management policy which is being applied to guide land use at present for the area as a whole, and the 'vision' for the future.]

Since 1 January 1998 parts of the proposed biosphere reserve, namely the wetlands along the River Helge å (the Ramsar site), have been the subject of a policy document formulated as a programme of action and adopted by the executive committee of the Municipality of Kristianstad and the County Administrative Board of Skåne. This programme provides the

local municipality and the County Administrative Board with a common platform and serves as a policy document for resolutions relating to nature conservation, physical planning, the preservation of the cultural environment, ecomuseum activities, tourism and recreation. Before the programme of action was ratified, it was reviewed and discussed in the forum of the *Samrådsgruppen för naturvård i Kristianstads Vattenrike* ("The Consultation Group for Nature Conservation in Kristianstads Vattenrike"), which comprises local government officers and politicians from the Municipality of Kristianstad, regional government officers from the County Administrative Board of Skåne and Region Skåne, and representatives for organisations representing agriculture, fishing, hunting, boating activities and voluntary nature conservation interests.
The activities of the consultation group are described in greater detail under §17.6.5.

The programme of action for nature conservation in Kristianstads Vattenrike includes the following points:

- The creation of a biosphere reserve in line with the UNESCO model (work is currently under way with four co-financing partners at local, regional and central government level).
- Nature protection (including the establishment of nature reserves, the acquisition of land for the purposes of nature conservation, increased accessibility for visitors, improved control over visitors, data for drawing up action plans for environmental subsidies to landowners/users).
- Management of state-owned and municipally-owned nature conservation areas (developing the activities controlled by agreements between the County Administrative Board and the municipality).
- Follow-up of management and coordination of environmental monitoring (developing ongoing activities in cooperation with the County Administrative Board, the municipality and voluntary organisations).

The intention is to gradually extend the scope of the work to encompass the entire biosphere reserve, with the main emphasis focused on the theme areas that are described in Chapter 13. This is described in greater detail under §17.6.2.

### 17.6.1. Indicate how and to what extent the local communities living within and next to the proposed biosphere reserve have been associated with the nomination process

[This can range from being an entirely locally driven initiative, to a more 'top down' approach led by government authorities or scientific institutions. Describe the steps taken and the stakeholders involved]

The ambition to create a biosphere reserve in the rich wetlands of a Kristianstads Vattenrike is a local initiative, spearheaded by the Municipality of Kristianstad. From the earliest days of the venture in 1989, operations under the umbrella of Kristianstads Vattenrike have consistently been characterised by a broad-based approach that paves the way for a wide interface with local communities. The concept of a biosphere reserve was introduced at the very start and sights were firmly set on one day being in a position to apply for and be granted formal recognition as a biosphere reserve. In the intervening years work in Kristianstads Vattenrike has, with varying degrees of intensity, been carried out within the three functions that are required of a biosphere reserve. Municipal representatives have also made study trips abroad to see for themselves how recognised biosphere reserves work in practice. On many occasions during these years local excursions and lectures have repeatedly confirmed the various ways in which the operations of Kristianstads Vattenrike closely resemble those of a biosphere reserve.

Following the intensification of national efforts by the Swedish MAB Committee, the Municipality of Kristianstad adopted a resolution to work towards submitting an application for approved biosphere reserve status to UNESCO.

At an early stage in the process "The Consultation Group for Nature Conservation in Kristianstads Vattenrike" was informed about the implications of biosphere reserve status and the work involved. This was important in view of the wide local support that the initiative enjoys. The programme of action for nature conservation in Kristianstads Vattenrike formulated by the consultation group for the period 2001 to 2003 also stated the ambition of working towards the establishment of a biosphere reserve.

In 2002 a Biosphere Candidate Office was established in the Ecomuseum. The consultation group has been kept continuously informed of developments in order to be able to discuss issues relating to the groundwork prior to the application.

Not only has the consultation group provided a forum for discussions about the biosphere reserve, but information, exchanges of ideas and discussions have been on the agenda in conjunction with numerous locally arranged excursions, lectures, seminars, workshops, etc. Recently the intensity of work relating to these information and discussion activities has increased, particularly with regard to the presentation in March 2004 to some 40 authorities, organisations, associations and individuals of the draft version of the nomination form to UNESCO. In conjunction with this, there have been numerous opportunities for information and discussion for a number of municipal operations, regional authorities, government ministries, associations and representatives for agriculture. In addition, several public information forums and opportunities for discussions were held during the spring of 2004. Moreover, from March 2004 onwards the draft version of the nomination form to UNESCO was posted on Kristianstad Vattenrike's website. Many organisations and authorities reacted by submitting comments and points of view relating to these documents. These statements of opinion were published on the website and the proposal has, to some degree, been supplemented with the points of view received.

Radio, TV and the local mass media also followed the nomination process with interest. There were, for example, around 20 newspaper articles during the spring and summer 2004. The Biosphere Candidate Office produced a special newspaper supplement that was printed in 40,000 copies and distributed to all households within the proposed biosphere reserve. During the spring of 2004 the Ecomuseum also produced a mobile exhibition about the proposed biosphere reserve. Since May 2004 this has been displayed in a variety of public settings, including the municipal library in Kristianstad.
Interest in the plans for a proposed biosphere reserve also led to a high-profile visit from King Carl XVI Gustav of Sweden, who, on the invitation of the County Administrative Board of Skåne, visited the rich wetlands of Kristianstads Vattenrike on the afternoon of 10 May 2004. The director of the Ecomuseum and representatives for the Municipality of Kristianstad guided the king around parts of the proposed biosphere reserve by boat and on foot. During his four-hour stay in Kristianstads Vattenrike the king not only had an opportunity to see how the ecomuseum works in practice, but also met local schoolchildren who work with the Nature School project and representatives both for the municipal executive committee and the County Administrative Board of Skåne. The king also spoke to local farmers to hear their points of view about nature conservation work on the seasonally inundated grasslands.

### 17.6.2. Main features of management plan or land use policy

(Describe the 'vision' of what the proposed biosphere reserve is expected to achieve in the short and longer term, and the benefits foreseen for the local communities and other stakeholders)

The programme of action for nature conservation in Kristianstads Vattenrike will gradually be expanded to encompass the entire biosphere reserve. The future land use policy and management plan for the biosphere reserve will be drawn up in much the same way as the programmes of action, with the consultation group playing a significant role in this process. At present the main thrust of the consultation group's work is directed to the area of wetlands, but as the remit of operations is extended, for example, as a result of work with the new theme areas, the composition and working methods of the consultation group will be adapted to correspond more closely to the needs of the biosphere reserve.
As work in the biosphere reserve progresses, the programme of action will be regularly revised and updated, not least with regard to the gradual expansion of the work with the new theme areas.

Future activities will also be integrated into municipal physical planning processes via the municipality's "comprehensive plan", which is a long-term vision for municipal development with regard to the future utilisation of land and water resources.
Engaging the local community in a variety of concrete projects in the biosphere reserve will also be one highly visible way of encouraging cooperation in formulating and implementing the management plan and the land use policy.

Local communities and others who are involved will benefit from the opportunity to participate in a variety of concrete projects that may be undertaken as a result of developing a management plan and land use policy for the biosphere reserve. This kind of involvement gives local communities an opportunity to take a more active part in the conservation of their surroundings and the development of various values. Individual suggestions can be combined to create feasible projects. The management plan and land use policy can bring together figures from the local, national and international arenas who complement one another's strengths, and, by working together, these individuals and the interests they represent can provide the necessary knowledge, expertise and funding to implement concrete projects. There are already several examples of such initiatives in projects relating to seasonally inundated grasslands, storks, the European catfish, local cultural environments, etc. With the passage of time, more and more activities will take place, and as the mutual benefits of these activities become increasingly apparent, they will lead to a mutual understanding for the land use policy that has been established.

### 17.6.3. The designated authority or coordination mechanisms to implement this plan or policy

(Name, structure and composition, its functioning to date)

As things stand today, the Ecomuseum/ Biosphere Candidate Office serves as a platform for coordination and operational activities that include, for example, the distribution of information via the website, printed materials, outdoor visitor sites in the area and projects relating to nature conservation, planning, research, etc. – all within the ambit of the operations of Kristianstads Vattenrike.

There are plans to establish a Biosphere Reserve Office in the future biosphere reserve. This office will extend the scope of its operations, on the one hand to fulfil the three functions which a biosphere reserve needs to serve, and on the other to be able to initiate, support and

coordinate work with the proposed theme areas: “Sandy grasslands formerly managed under a rotational system of cultivation and fallow”, “Rich woods and forests on the slopes of Linderödsåsen Ridge”, “The coastal waters of Hanöbukten Bay”, etc.

The Biosphere Reserve Office’s function will be to coordinate activities within the area and to support, initiate and follow up activities carried out by other parties that meet the biosphere reserve’s criteria for conservation and development based on the management plan or policy that exists for the area. The Biosphere Reserve Office will also be able to assist with the provision of data, documentation and proposals on which local, regional and national bodies will be able to base their decisions.

### 17.6.4. The means of application of the management plan or policy

(For example through contractual agreements with landowners or resources users, traditional users’ rights, financial incentives, etc.)

The programme of action for nature conservation in Kristianstads Vattenrike has been realised by establishing nature reserves under the provisions of the Environmental Code in the areas most worthy of protection, or by proposing that areas are designated under the terms of the EU Habitat Directive or the EU Birds Directive so that they are incorporated into the EU’s Natura 2000 network of sites worthy of conservation. Political decisions have been made regulating how municipally-owned land with high natural values is to be used in order to preserve the natural and recreational values.

Funds for the management of these areas are provided through special state grants for conservation or via the municipal budget for the organisation of local nature conservation operations. The most important instrument for the management of what are, from the point of view of nature conservation, very valuable natural grazing lands and hay meadows – irrespective of whether these are protected as nature reserves or not – is the environmental compensation for which farmers of these types of land can apply via the EU-funded “Agro-Environmental and Rural Development Programme for Sweden”.

Small forested areas with high natural values have been protected by setting aside habitat protections areas or by establishing nature conservation agreements with the landowners. Here, too, opportunities exist for applying for financial support to implement management measures.

As part of the process of gaining sympathy for and generating interest in nature conservation work and the management of different types of landscape, the Ecomuseum Kristianstad Vattenrike has been instrumental in taking the initiative in a large number of nature conservation projects that have been co-financed by, among others, WWF, Region Skåne and the Swedish state (via the local investment programme for a sustainable Sweden).

### 17.6.5. Indicate how and to what extent the local communities participate in the formulation and the implementation of the management plan or policy

(informed/consulted: decision making role etc.)

The Programme of Action for Nature Conservation in Kristianstads Vattenrike is a three-year plan. Prior to the start of each new three-year period the proposals are reviewed together with the Consultation Group for Nature Conservation before they are forwarded to the municipal and regional authorities for discussion and ratification.

The 25 or so members of the consultation group represent a variety of interests in the area, including local organisations, local government officers and politicians, as well as representatives for certain regional authorities.

The group's current members represent:

- The Federation of Swedish Farmers (LRF) in the Municipality of Kristianstad
- Kristianstads Naturskyddsförening ("Kristianstad's Society for Nature Conservation")
- Nordöstra Skånes Fågelklubb ("The Bird Society of North-East Scania")
- Nedre Helgeåns Fiskevårdsområde ("The Lower River Helge å Fishery Conservation Association")
- Vramsåns Fiskevårdsförening ("The River Vramsån Fishery Conservation Association")
- Kristianstad-Bromölla Jaktvårdskrets ("Kristianstad-Bromölla Game Conservation Association")
- Christianstads Motorbåtsklubb ("Kristianstad Motor Boat Club")
- Beckhovets fiskebodsförening ("Beckhovets Fishery Association")
- County Administrative Board
- Regional Forestry Board of Södra Götaland
- Region Skåne
- Kristianstad University

**Municipality of Kristianstad**

- Local Real Estate Office
- Department for Environment and Health
- Office of Architecture
- C4-Teknik (Department of Public Works)
- C4 Arbetsmarknad (Municipal Labour Market)
- Local Government head office with Tourism
- Department for Cultural Affairs and Recreation
- Department for Education and Childcare
- Ecomuseum Kristianstads Vattenrike
- Executive Committee
- Committee for Environment and Health

The consultation group usually meets on three occasions each year, and at least one of the meetings is held outdoors on site somewhere in the area to enable members of the group to acquaint themselves with an issue of topical interest: for example, an on-the-spot update on future operational plans, an opportunity to see the result of work carried out, or familiarisation with a specific problem that requires discussion. The chair of the consultation group has also chaired the municipal committee for environment and health for many years, and the secretary in the group is the nature conservation coordinator in Kristianstads Vattenrike. The minutes of the meetings are also distributed to representatives of authorities and organisations at central level.

The role of the consultation group is purely advisory, but thanks to the fact that it represents such a broad spectrum of interests, it has been able to make clear recommendations and submit proposals that have subsequently been adopted by a number of interested parties.

### 17.6.6 The year of start of implementation of the management plan or policy

1 January 1998. The action programme is a three-year project. Prior to the start of each new three-year period the proposals are reviewed together with the Consultation Group for Nature Conservation in Kristianstads Vattenrike before they are forwarded to the municipal and regional authorities for discussion and ratification. The most recently adopted programme for the period 2004 to 2006 was ratified by the Municipal Executive Committee in Kristianstad in 17 December 2003 and by the County Administrative Board of Skåne on 18 December 2003.

### 17.7. Financial source(s) and yearly budget:

[Biosphere reserves require technical and financial support for their management and for addressing interrelated environmental, land use, and socio-economic development problems. Indicate the source and the relative percentage of the funding (e.g. from national, regional, local administrations, private funding, international sources etc.) and the estimated yearly budget in the national currency]

The office of the Ecomuseum has developed and expanded since 1989. During the last three years, since 2001, the *Ecomuseum* organisation has been reinforced thanks to project funding for a *Biosphere Candidate Office.* Continuous project funding is available for *nature conservation coordination work* and financial resources guaranteed by contract have made it possible to establish a *Nature Conservation Management Organisation*.

In 2003 there was a total of 22 employees (6 permanent/full-time and 16 part-time).

In addition to the resources mentioned above, a large number of other people are engaged in various activities relating to the biosphere reserve. These individuals may be employed by municipal offices, the County Administrative Board, Kristianstad University or other universities. The activities in which they are engaged may be run on a project basis financed by, for example, external funds which it is important to monitor.

In future the organisation needs to be expanded and developed in a variety of ways in order to be better able to fulfil the functions that are defined for a biosphere reserve and, as a result, the objectives that have been established for these model areas for conservation and development. There are many advantages in continuing in much the same fashion as before, by combining a permanent staff with a large number of cooperating partners who provide access to technical and financial resources for various projects.

The annual budget for the Ecomuseum/Biosphere Candidate Office, Nature Conservation Management Organisation and nature conservation coordinator varies to some degree from year to year, as do the allocations from various project funds.

The figures below refer to 2003, which by and large may be considered as a fairly representative year. The total budget for this year was SEK **5,514,000** (corresponding to approximately EUR 605,000 or approximately USD 777,000)

This total breaks down as follows:

| | | |
|---|---|---|
| Local funding: | 62 % | Municipality of Kristianstad |
| Regional funding: | 21 % | County Administrative Board 17 %; Region Skåne 3 %;<br>Kristianstad University 1 % |
| National funding: | 5 % | Swedish Environmental Protection Agency 4.8 %,<br>Swedish Research Council 0.2 % |
| Other funding: | 12 % | WWF 12 % |

### 17.8. Authority(ies) in charge

#### 17.8.1. The proposed biosphere reserve as a whole:

**Name:** The Municipality of Kristianstad

**If appropriate, name the National (or State or Provincial) administration to which this authority reports**
Currently this is not relevant in the case of the proposed biosphere reserve.

### 17.8.2. The core area(s):
[Indicate the name of the authority or authorities in charge of administering its legal powers (in original language with English or French translation]

In Sweden coordination and administration is organised centrally in a number of government departments, for example the Swedish Environmental Protection Agency, the Swedish National Board of Housing and the Swedish National Heritage Board, while local authorities ensure that current legislation is observed.

Regional authority: County Administrative Board of Skåne
Local authority: The Municipality of Kristianstad

### 17.8.3. The buffer zone(s)

As is the case for the core area (above) coordination and administration is organised centrally, while local authorities ensure that current legislation is observed.

Regional authority: County Administrative Board of Skåne, Regional Forestry Board of Södra Götaland.
Local authority: The Municipality of Kristianstad

## 18. SPECIAL DESIGNATIONS:

[Special designations recognize the importance of particular sites in carrying out the functions important in a biosphere reserve, such as conservation, monitoring, experimental research, and environmental education. These designations can help strengthen these functions where they exist or provide opportunities for developing them. Special designations may apply to an entire proposed biosphere reserve or to a site included within. They are therefore complementary and reinforcing of the designation as a biosphere reserve. They are therefore complementary and reinforcing to designation as a biosphere reserve. Check each designation that applies to the proposed biosphere reserve and indicate its name]

Name:

(No ) UNESCO World Heritage Site

(Yes ) RAMSAR Wetland Convention Site

(Yes ) Other international/regional conservation conventions/directives [Please specify]
The European Commission's directive 79/409/EEG dated 2 April 1979 on the conservation of wild birds (The Birds Directive) and the European Commission's directive 92/43/EEG dated 21 May 1992 on the conservation of habitats of wild flora and fauna (The Habitat Directive).

( Yes) Long term monitoring site [Please specify]
See Appendix 8 – Environmental monitoring activities in Kristianstads Vattenrike.

(No ) Other [Please specify]

## 19. SUPPORTING DOCUMENTS (to be submitted with nomination form)

[Clear, well-labelled maps are indispensable for evaluating Biosphere Reserve proposals. The maps to be provided should be referenced to standard coordinates wherever possible. Electronic versions are encouraged]

### (X) General location map

A GENERAL LOCATION MAP of small or medium scale must be provided showing the location of the proposed Biosphere Reserve, and all included administrative areas, within the country, and its position with respect to major rivers, mountain ranges, principal towns, etc.

Appendix 1

### (X) Biosphere Reserve zonation map [large scale, preferably in black & white for photocopy reproduction]

[A BIOSPHERE RESERVE ZONATION MAP of a larger scale showing the delimitations of all core area(s) and buffer zone(s) must be provided. The approximate extent of the transition area(s) should be shown, if possible. While large scale and large format maps in colour are advisable for reference purposes, it is recommended to also enclose a Biosphere Reserve zonation map in a A-4 writing paper format in black & white for easy photocopy reproduction. It is recommended that an electronic version of the zonation map be provided ]

Appendix 2

### (X) Vegetation map or land cover map

[A VEGETATION MAP or LAND COVER MAP showing the principal habitats and land cover types of the proposed Biosphere Reserve should be provided, if available].

Appendix 3

## (X) List of legal documents (if possible with English or French translation)

[List the principal LEGAL DOCUMENTS authorizing the establishment and governing use and management of the proposed Biosphere Reserve and any administrative area(s) they contain. Please provide a copy of these documents, if possible with English or French translation].

Appendix 4

## (X) List of land use and management plans

[List existing LAND USE and MANAGEMENT PLANS (with dates and reference numbers) for the administrative area(s) included within the proposed Biosphere Reserve. Provide a copy of these documents]

Appendix 5

## (X) Species list (to be annexed)

[Provide a LIST OF IMPORTANT SPECIES (threatened species as well as economically important species) occurring within the proposed Biosphere Reserve, including common names, wherever possible.]

Appendix 6

## (X) List of main bibliographic references (to be annexed)

[Provide a list of the main publications and articles of relevance to the proposed biosphere reserve over the past 5-10 years].

Appendix 7

In addition to the abovementioned appendices:

Appendix 8 Summary of environmental monitoring activities
Appendix 9 Photographs
Appendix 11 Letters of endorsement

## 20. ADDRESSES

### 20.1. Contact address of the proposed biosphere reserve:

[Government agency, organization, or other entity (entities) to serve as the main contact on the MABnet to whom all correspondence within the World Network of Biosphere Reserves should be addressed.]


Name: Biosfärkontoret Kristianstads Vattenrike

Street or P.o:Box: Kristianstads kommun

City with postal code: SE-291 80 Kristianstad

Country: Sweden

Telephone: +46 44 13 64 80 or +46 44 13 64 83

Telefax : +46 44 13 64 84

E-mail: sven-erik.magnusson@kristianstad.se

Web site: www.vattenriket.kristianstad.se


### 20.2. Administering entity of the core area and the buffer zone:

Correspondence to the administrative units for the core areas and buffer zones concerns numerous bodies and organisations (see Chapter 5). Please address all correspondence relating to these areas to the Biosphere Office of Kristianstads Vattenrike, from where it will be forwarded to the appropriate organisation/unit.
Information about the organisations and bodies concerned may be found on the following websites:

**Swedish Environmental Protection Agency (EPA)**

*Naturvårdsverket*

www.naturvardsverket.se

**County Administrative Board of Skåne**

*Länsstyrelsen i Skåne län*

www.m.lst.se

**Regional Forestry Board of Södra Götaland**

*Skogsvårdsstyrelsen Södra Götaland*

www.svo.se

**Municipality of Kristianstad**

*Kristianstads kommun*

www.kristianstad.se

# Kristianstads Vattenrike Biosphere Reserve

The proposed biosphere reserve is in Skåne, the southernmost of Sweden's provinces. The area includes the lower drainage basin of the River Helge å in the Municipality of Kristianstad and the coastal waters of Hanöbukten Bay, which forms part of the Baltic Sea. It covers approximately 100,000 hectares and contains within its boundaries landscapes and biological values of regional, national and international importance.

*An Ecomuseum with numerous visitors' sites, raised boardwalks and birdwatching towers provide easy access to the area and explain what the immediate surroundings have to offer. The Kristianstad Nature School has its own vehicle with field equipment and several permanent teaching and tuition sites in the wetlands, like here at the Canal House Outdoor Museum only a few hundred meters from towncenter of Kristianstad.*

***Working party for the Nomination Form from left:***

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