BIOSPHERE RESERVE

Lake Vänern Archipelago and Mount Kinnekulle

NOMINATION FORM

Biosfär
KANDIDAT
VÄNERSKÄRGÅRDEN
MED KINNEKULLE

The nomination form, documents and appendices are also available on the website: www.vanerkulle.se

Authors:

Johanna MacTaggart, Birgitta Gärdefors, Johanna Olsson, Clas-Göran Crommert, Håkan Magnusson, Bo Magnusson, Lars-Göran Nilsson. In addition, a large number of people have contributed with documentation and other materials.
Translation and proofreading: Maria Morris Translations

Cover photo:

Johanna Olsson

Maps:

The Biosphere Candidate Office has together with the municipalities produced all the maps included in the nomination form and appendices. Background maps from Lantmäteriet.

Working party for the Nomination Form:

Johanna MacTaggart, coordinator
Biosphere Candidate Office
Götene municipality

Birgitta Gärdefors
Municipal ecologist
Götene municipality

Johanna Olsson
Municipal ecologist
Lidköping municipality

Clas-Göran Crommert
Development strategist
Mariestad municipality

Mariestad, December 1st 2008

TABLE OF CONTENTS

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]

Lake Vänern Archipelago and Mount Kinnekulle 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.)

The Lake Vänern Archipelago and Mount Kinnekulle area meets the criteria for ”conservation, development and logistic support” that apply to biosphere reserves around the world under the *Statutory Framework*. Within the area, numerous activities and programmes are undertaken that all contribute to the fulfillment of these guidelines.

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)

Lake Vänern Archipelago and Mount Kinnekulle include large areas of high landscape value, from a biological, ecological and cultural history perspective. Large parts of these areas are protected under national legislation with the aim to conserve the values for future generations. Protection also helps to safeguard biological diversity and to ensure that traditional knowledge is not forgotten, but passed on. The biological values are dependent on traditional land management practices, such as haymaking and pollarding. Management of the protected land areas is set out in management plans, supported by landowners and the County Administrative Board, which guarantee a continued customary use of the land. There are also areas that are of national interest for outdoor recreation, contributing to the well-being and health of the public.

The 278,600 ha area has a highly varied flora and fauna. On Mount Kinnekulle alone, 15 species that are included in the Birds and Habitats Directives occur, as well as a few hundred red-listed and nationally threatened species. The entire area is home to at least 171 species in the vulnerable (VU), endangered (EN) or critically endangered (CR) categories on the national Red List. There are 50 EU-listed species, of which 33 are listed in the Birds Directive and 20 species occur on the global IUCN Red List.

The proposed biosphere reserve includes several landscape types. The archipelagos around Kållandsö, Brommö, Kalvö and Djurö, include a mixture of bare islets and large islands. A number of habitat types included in the ecological EU network Natura 2000 are found here, e.g. western taiga (9010) and hydrophilous tall herb fringe communities of plains and of the montane to alpine level (6430). Threatened bird species in the area include osprey *(Pandion haliaetus)*, nightjar *(Caprimulgus europaeus)*

and black-throated diver *(Gavia arctica)*, to mention a few. Lake Vänern Archipelago and Mount Kinnekulle also include areas of high geological value, e.g. Mount Lugnåsberget with sedimentary rock, Brommö archipelago with immense shifting sand dunes, and a number of end moraines and eskers. Mount Kinnekulle; a plateau with limestone pavement (alvar) habitats, traditional pastoral landscape and old 'church villages' is unique in Sweden. The area is rich in cultural treasures, e.g. the Minnesfjäll millstone quarry at Lugnås, where you can see how millstones were quarried dating back to medieval times. The mine is run by a local society but is owned by Västergötland Museum, thus safeguarding its long term protection. Traces of historic human activity exist alongside the modern culture of today. It is precisely this mix of old cultural landscapes, areas with high biological conservation values, and modern communities that makes the proposed biosphere reserve valuable from a national perspective. The diversity of the area offers a great potential for making it a model for other parts of Sweden.

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).

There are many different stakeholders working for sustainable development within the proposed biosphere reserve. Sweden has 16 national environmental objectives that set out the ecological aspect or environmental dimension of sustainable development. These environmental objectives have been adapted and made concrete for the Västra Götaland region. All three municipalities included in the proposed biosphere reserve have adopted local environmental targets and programmes that ensure long-term sustainability for local activities. Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve will function as an umbrella organisation, guiding and supporting the different stakeholders, arranging training and education, and providing a neutral arena for such activities. In addition, the biosphere reserve offers the three municipalities opportunities for collaboration and learning from each other's successful and less successful projects. In this way, the biosphere reserve will serve as a demonstration area for sustainable development, providing other regional and national sites opportunities to learn from such inter-municipal collaboration.

Rural areas dominate in the proposed biosphere reserve. The population centres Götene, Lidköping and Mariestad are surrounded by arable plains. This makes it possible to implement sustainable development in urban environments that are directly linked to, and have impact on, the surrounding rural areas. The municipalities have the ambition to develop sustainable community planning in urban areas, for example relating to housing, infrastructure and energy use. The biosphere reserve will continue to initiate inter-municipal projects that lead to increased knowledge about how the structure of building developments, transport and green areas inter-relate, and how the economic, ecological, social and cultural conditions of rural areas can further stimulate sustainable development, resulting in a model for urban environments. Examples of previous and on-going initiatives include *Dynamic growth capital, Sustainable infrastructure for soft tourism, and Sustainable Lidköping.*

The landscape values in the area provide a good base for the development of tourism. Sustainable eco-tourism based on landscape values benefits both large tourist companies and small entrepreneurs. As an example, a number of entrepreneurs have focused on growing local produce, giving visitors a further experience from the area – i.e. taste. There is also a potential for developing new technologies for the processing of local food, energy recovery, alternative crops, and much more. All in all, the wide range of activities and stakeholders in the area forms an important part of the socio-economic development, and the area is already in the forefront of sustainable development in Sweden. Some examples of this include Sweden's first "passive house" built in Lidköping, farm-based biogas production and the implementation

of the pilot project *Dynamic growth capital.*

During the candidature (2006-2009) the biosphere candidate office has greatly focused on sustainable development by actively supporting a number of development projects. *Eco-tourism destination 2012* is an action plan for the development of infrastructure for eco-tourism, e.g. the construction of hiking trails, cycle routes, access points for canoes and kayaks, design of information material and marketing schemes. The plan was drawn up together with local and regional stakeholders and is a comprehensive approach to eco-tourism development. In this way, the Lake Vänern Archipelago and Mount Kinnekulle area has created a consensus that drives this development forward. A well-developed infrastructure is necessary in order to achieve social and economic development in the area. The responsibility of the biosphere office is to offer guidance, ensuring that this development is also ecologically sustainable.

The pilot project *Sustainable travel for soft tourism*, which aims to provide access for everyone to fine natural and cultural environments WITHOUT increasing car travel, has meant that valuable nature areas accessible by bus have been highlighted on the websites of tourist offices and regional bus companies. This project has received great attention, both regionally and nationally, for its innovativeness. The Lake Vänern Archipelago and Mount Kinnekulle area will continue to be active in this type of demonstration projects, making it a true model area for sustainable development!

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).

Research and education play a central role in a biosphere reserve. There are already a great number of initiatives within the proposed biosphere reserve that aim towards providing environmental education and various types of advice/guidance. There are also continuous observation series of environmental monitoring data carried out by large organisations such as the Lake Vänern Society for Water Conservation and the Swedish Forest Agency. There are several institutions within or in close proximity to the proposed biosphere reserve with great potential for carrying out further research and studies, e.g. in the areas of technology, agronomics, socio-economics, cultural history and biology. The scope for research was also shown in the feasibility study (2005/2006) through the number of students that have written papers or carried out projects directly linked to the area.

The creation of Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve would give students further opportunities to apply their knowledge through projects and degree projects directly linked to activities in the area. Collaboration with researchers, universities and university colleges in the area brings clear advantages: the area serves as a model for other parts of Sweden, Europe and the world, operators gain access to new technology, and the number of jobs for people with an academic education increase. Efforts have already been made to establish a research network to facilitate contacts and processes *both* between researchers and students and between practitioners and operators in the area.

Research is carried out at the University of Gothenburg and the Lake Vänern Museum, both located within the proposed biosphere reserve. Less than 30 km away is the University of Skövde and the Swedish University of Agricultural Sciences (SLU) at Skara.

Dacapo Hantverksskola in Mariestad started in 1994 and developed its activities into so called advanced vocational education (KY) specialising in building and garden crafts. The organisation expanded to include university courses and is now linked to the Department of Conservation at the *University of*

Gothenburg. The Building Crafts Programme provides skills qualifications in building crafts with in-depth studies in woodworking or stonemasonry. The Garden Crafts and Design Programme covers the usage, maintenance and design of gardens and parks. The department communicates knowledge about traditional crafts that may otherwise be forgotten. Autumn 2008 sees the introduction of a new educational programme, *Landscape management*, which has been developed in collaboration with the biosphere candidate office and includes courses focused on "biosphere reserves".

At *Lake Vänern Museum*, research is carried out on the biology, archaeology and evolution of Lake Vänern. Research results are presented alongside regular exhibits at the museum. Exhibitions, talks and other activities at the museum of the "Large Lake" reflect life on, in and around Lake Vänern. The museum is also a great pedagogical resource in the area, with numerous activities for school children. Lake Vänern Museum is running a pilot project together with the De la Gardie Upper Secondary School, aiming to raise awareness among the younger generation about the importance of sustainable development. The project is based on an inspiring collaboration between museum staff, teachers and upper secondary school pupils, which during a three-year period are trained to become landscape guides with specialist knowledge in chosen areas.

Less than 20 km south of the proposed biosphere reserve is the city of Skara, home to one of SLU's campuses, with around 350 students. Education is focused on industry-proximate foodstuffs expertise, animal husbandry and welfare, precision agriculture and animal medical treatment. SLU in Skara is renowned for its close ties to Swedish husbandry, its close collaboration with commerce and industry, and its international collaboration within a number of research areas.

The University of Skövde, located around 30 km south of the proposed biosphere reserve, offers e.g. an Ecology Programme which aims to communicate wide knowledge within the areas of ecology, the environment and sustainable development. Students are also provided with basic knowledge of handling tools related to professional life, e.g. geographic information systems (GIS). The 3-year bachelor's degree (180 he credits) includes courses in biology, nature conservation, natural history, climate, wetland ecology, etc.

Within the proposed biosphere reserve there is *learning for sustainable development* at upper secondary school level. In the new upper secondary school reform, sustainable development forms an element of all courses in the Social Science and Natural Science programmes. *The Lake Vänern Programme* in Lidköping combines the Natural and Social Science upper secondary school programmes. The programme includes a number of practical elements where pupils have the opportunity to carry out investigations, inventories and documentation, often in collaboration with the Lake Vänern Museum. In this way, pupils can contribute to the collection of data for the museum's research projects. Mid-way through the programme, pupils specialise in either culture or the environment, still using Lake Vänern and surrounding areas for practical learning.

Hållplats Vänern is a mobile field station specifically aimed at stimulating the interest of children and youth in natural science. The field station has lab equipment and information material to enable school children to carry out investigations about the natural and cultural environments in the Lake Vänern area. The aim is to give pupils an understanding of the environmental objectives, their importance for human habitats and health, and to relate changes in the environment to human activities. The field station is run by the Lake Vänern Museum.

There are further initiatives aimed at increasing knowledge and information within the proposed biosphere reserve. Political discussions regarding the establishment of a joint Nature School in the

biosphere reserve started in autumn 2007, and a naturum visitors' centre at Läckö will be opened in summer 2010. This is also when Kvarnen Science Centre, with focus on energy, will be ready. The centre aims to provide a comprehensive view of energy issues in order to provide children and youth with a deeper understanding of the complex problems that surround our energy use.

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 proposed biosphere reserve encompasses a mosaic of ecosystems, both in protected areas and agricultural landscapes.

The Lake Vänern Archipelago and Mount Kinnekulle area is located in the boreal region of the globe and encompasses ecosystems that occur in temperate and sub-polar broadleaf forests and woodlands. The proposed biosphere reserve encompasses a varied landscape with different ecosystems linked to local biotopes. These include lakes, rivers and watercourses, rapids, river ravines and spawning areas for fish, small-scale habitats in the agricultural landscape, rocky shores and flat-rock pine forests, large reed beds, shore meadows, bird skerries, old-growth forests, swampy forests, alder swamps, rich fens, oak meadows and selected valuable broadleaved forests, limestone pavements and calcareous grasslands, and natural pastures. The rich biological diversity includes a number of species that are directly protected under Swedish legislation or the EU Birds and Habitats Directives.

Humans have inhabited the area for at least 7,000 years, according to dating of the oldest known settlements located in the south-western part of the area. Sometime around 5,000-6,000 years ago, humans started to cultivate the landscape, which led to a gradual change towards the open landscape we see today. From this perspective, humans have had a great impact on the landscape and also on the ecosystems and species that are associated with the existing biotopes. Today, farming and forestry are carried out in the entire area, and Lake Vänern is continuously fished by professional fishermen. In total, 59,561 people live in the area (March 2008), of which around 46,500 people live in the largest towns, Götene, Lidköping and Mariestad. Extensive agricultural landscape where people support themselves by farming and agriculture, or forestry, surround the urban areas.

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 Lake Vänern Archipelago and Mount Kinnekulle area encompasses terrestrial and limnological habitats for a great number of species, some of which are threatened. All in all, 16,281 ha of the total surface area are strictly protected under Swedish legislation.

Dättern, classified as a wetland area of international importance, Ramsar, is a popular breeding and

resting area for birds, but there are also a number of important bird sanctuaries in other parts of the proposed biosphere reserve.

Mammals occurring in the area include six globally red-listed species: beaver *(Castor fiber)*, 2 species of bats (*Barbastella barbastellus* and *Myotis dasycneme*), otter *(Lutra lutra)*, red squirrel *(Sciurus vulgaris)* and hazel dormouse *(Muscardinus avellanarius)*. Two fish species are near threatened: European river lamprey *(Lampetra fluviatilis)* and European brook lamprey *(Lampetra planeri)*. There is a rich occurrence of great crested newt *(Triturus cristatus)* in parts of the area. Likewise, the hermit beetle *(Osmoderma eremita)* thrives in the large oaks on Mount Kinnekulle. The most unusual biotopes in the area are limestone pavements (alvar) and, hydrophilous tall herb fringe communities and western taiga.

The proposed biosphere includes:

- 20 species on the global IUCN Red List
- At least 33 species mentioned in the EU Birds Directive
- At least 18 species mentioned in the EU Habitats Directive
- At least 171 species that are nationally red-listed as vulnerable (VU), endangered (EN) or critically endangered (CR).
- 27 Natura 2000 sites
- One national park
- One Ramsar site
- 35 nature reserves
- Economically significant species include vendace *(Coregonus albula)*, common whitefish *(Coregonus lavaretus)*, salmon *(Salmo salar)*, cattle, oil plants, potato, spelt *(Triticum spelta)*, pine *(Pinus sylvestris)* and spruce *(Picea abies)*.

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")

In preparation for the nomination as a UNESCO Biosphere Reserve, a number of initiatives have been set up that demonstrate the excellent opportunities for Lake Vänern Archipelago and Mount Kinnekulle in becoming a pilot area for sustainable development. On such pilot project worth mentioning is *Sustainable travel for soft tourism*, as it is the only project of its kind in Sweden, and perhaps in the world. The project was managed by the County Administrative Board of Västra Götaland and resulted in an action plan for the development of the Lake Vänern Archipelago and Mount Kinnekulle area into an eco-tourism destination. The stakeholders were involved in designing the plan by producing basic documentation and writing their own sub-chapters. In this way, they are also responsible for the implementation of their proposed measures. The biosphere candidate office has the overall responsibility for implementation of the action plan and serves as a neutral convening body and a common forum for the stakeholders. It is important to mention that a great number of associations were engaged at an early stage of the project. The project has caused ”ripples on the water” and has been demonstrated and presented at regional and national fora. In addition, the County Administrative Board of Västra Götaland is presenting a programme proposal to the government for the development of nature and culture tourism in the county. The proposal stresses, among other things, the importance of promoting a more sustainable tourism by increasing the percentage of travel by public transport, which requires increased investments in infrastructure. The proposal also calls for an investigation into how nature and culture attractions can get a share of the

proceeds from tourism, and how to increase knowledge about how protected areas may contribute to the development.

The Lake Vänern Archipelago and Mount Kinnekulle area sees great potential in the development of a special method for landscape analysis. The ARDII method is based on a programme designed by Professor Michel Etienne in *Smalltalk: "Companion modelling and visualising stakeholders"*. Such a project would be the only one, or one of the first, of its kind in Sweden. The islands of Torsö and Kållandsö are ideal study objects, as they are geographically defined and do not include major protected areas. They are also home to a number of active organisations and associations. The Lake Vänern Archipelago and Mount Kinnekulle area has a great potential for becoming a pilot area for this unique project.

A clear effect of the process that the Lake Vänern Archipelago and Mount Kinnekulle area is undergoing on its way to become recognised as a UNESCO Biosphere Reserve is the active collaboration of municipalities across administrative borders. This is a slow process which must be allowed to take its time, and will result in strong long-term cooperation. The Lake Vänern Archipelago and Mount Kinnekulle area sees great opportunities here, as good examples of sustainable development, e.g. *Sustainable Lidköping*, can be reproduced throughout the area. The proposed biosphere reserve will serve as a model for other municipalities that are planning inter-municipal collaboration.

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 are(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 proposed biosphere reserve encompasses a large geographical area, 278,600 ha, with good opportunities for fulfilling the functions of *conservation, development and logistic support*. The core areas are mostly surrounded by large buffer zones that serve to strengthen the protection of the core areas and reduce the edge effects. There are 78 core areas with different conservation objectives, which reflect the biological diversity of the area. The core areas are surrounded by a total of 19 buffer zones, where special consideration is given to natural and cultural values.

The majority of the population lives in the transition area, but sustainable uses of natural resources and sustainable development are tested and demonstrated throughout the proposed biosphere reserve. The area and its zonation is of a sufficient size to fulfil the aims in core areas and buffer zones.

4.5 Through appropriate zonation :
"(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 a national park, nature reserves, Natura 2000 sites and forest habitat protection areas. These are all protected by Swedish law in accordance with the Swedish Environmental Code, which came into force on 1 January 1999. The Natura 2000 sites are covered by the Birds and Habitats Directives. The proposed biosphere reserve includes core areas in both terrestrial and limnological environments. The core areas cover a total of 16,281 ha, which is 5.8% of the total surface area of the proposed biosphere reserve. Excluding the water area (approx. 192,000 ha) in the proposed biosphere reserve, the core areas form 8.5% of the terrestrial surface.

Some core areas enjoy more than one type of protection. The total area of protected land is:

- National park: 2,358 ha
- Nature reserves: 3,658 ha
- Natura 2000 sites: 24,223 ha
- Forest habitat protection areas: 64.6 ha

The main conservation objectives of the core areas are largely linked to archipelago environments, oak landscapes, pavements (alvar) on Mount Kinnekulle and valuable forest areas. Activities in the core areas are limited by regulations covering the above-mentioned protection 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 consist of areas designated as areas of national interest for the purpose of nature conservation, areas of national interest for the purpose of conservation of the cultural environment, Ramsar site, nature conservation areas, forest with nature conservation agreements, fish protection areas and protected shores. In these areas, special consideration is given to natural and cultural values. Shore protection areas, areas of national interest and nature conservation areas are covered by Swedish legislation in accordance with the Swedish Environmental Code, and the Ramsar site is covered by the Ramsar Convention of Wetlands which came into force in 1975. The total area of the buffer zones is 40,876 ha, which is 14.7% of the total area of the proposed biosphere reserve. Excluding the water area (approx. 92,000 ha) in the proposed biosphere reserve, the buffer zones form more than 21.3% of the terrestrial surface.

Different forms of protection overlap in the buffer zones. The total area of protected land in the buffer zones consists of:

- National interest for the purpose of conservation of the cultural environment: 23,218 ha
- National interest for the purpose of nature conservation: 34,912 ha
- Nature conservation areas: 15,879 ha
- Ramsar site: 410 ha
- Forest with nature conservation agreements 87,2 ha
- Shore protection areas: 16,058 ha

Agriculture and forestry, clearance of pastures and forests, haymaking and reed clearance are carried out in the buffer zones. The buffer zones also include large recreational areas, where eco-tourism commonly occurs. Activities in the buffer zones are limited by regulations covering the above-mentioned protection areas.

"(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 221,443 ha, of which 64,000 ha are terrestrial. The transition area surrounds the buffer zones and consists of the most southern, eastern,

western and northern parts of the area. De largest population centres, Götene, Lidköping and Mariestad, are located in the transition area, and the majority of the population lives here. Housing areas, urban environments and industries in urban areas are surrounded by agricultural landscape and rural areas with small villages. It is a task for the proposed biosphere reserve to strive for a balance between urban and rural environments, ensuring that the landscape resources in the area are balanced with social and economic development in a sustainable way. Organic farming, sustainable forestry and biogas production are examples of activities that are carried out in the transition area, and the proposed biosphere reserve sees great potential for further development of these activities.

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)

The proposed biosphere reserve will be organised as a non-profit organisation. The association will largely consist of a consultation group, a working group and a board. The consultation group, represented by association members, will meet regularly to discuss the affairs of the biosphere reserve. The group will be a forum where all sections of society are represented, from the private and the voluntary sectors to the public sector. Membership in the association is voluntary. The consultation group can be regarded as a knowledge bank since it includes a wide range of stakeholders. A working group is linked to the biosphere office and serves as a direct link to the three municipalities. The main aim of the working group is to create joint processes for the three municipalities, intensify their ordinary work with sustainable development, sustainable community planning and environmental work. A board is responsible for the activities and the economy of the biosphere reserve. The board will consist of members from the private, voluntary and public sectors, with the public sector forming a minority.

During the development of the Lake Vänern Archipelago and Mount Kinnekulle into a biosphere reserve, structures have already been established. The collaboration group has met once a year during the candidacy. More frequent meetings have not been necessary, as thematic groups have met in the meantime. It is of great importance that the biosphere reserve has a dynamic structure to enable a direct response to outside stimulation from communities and other organisations. This is the reason for setting up thematic groups that will address specific questions and matters. The thematic groups can, if necessary, remain in place for longer periods. The main task of the biosphere reserve is to create collaboration processes between stakeholders concerned in order to cope with conflicts of interest, and to promote sustainable development.

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)

In the proposed biosphere reserve, some of the activities in core areas and buffer zones are regulated via existing legislation. Further restrictions regarding land use or activities may be reached through voluntary agreements. Environmental aid and various EU grants indirectly regulate land use in the area.

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

The municipalities carry out physical planning in the area, and can influence how the area is managed through outline plans and future plans. The comprehensive *policy and implementation mechanism* for the biosphere reserve will consist of the coordinated contents of the outline plans from the three municipalities. When outline plans are drawn up, strict requirements are made on civic participation and democratic support for the plans.

The steering group for the proposed biosphere reserve has adopted a vision, a mission and a development plan for the area. The development plan is a living document which is upgraded and adapted to accommodate changes in the community at large. The biosphere reserve and its activities will be evaluated as early as 2013. The process to establish a land use policy for the proposed biosphere reserve has been under way during the candidacy, and will continue within the new biosphere reserve organisation.

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

Yes	No	Planned
		√

The non-profit organisation *Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve* will have the overall responsibility for ensuring that developments in the area are in accordance with the adopted development plan. The development plan will concern the protection of biological diversity, sustainable development, logistic support for research and development, and the development of international cooperation contributing to the World Network of Biosphere Reserves. The association's board, with representatives from the private, public and voluntary sectors, has the ultimate responsibility for activities in the biosphere reserve.

A Biosphere Reserve Office is planned for 2009. The functions of the office will be to initiate processes, support ongoing work, and coordinate initiatives in the area that concern both development and conservation.

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

Ongoing abiotic and biotic research is largely focused on Lake Vänern, while socio-economic research is more diverse and includes research focused on archaeology, and cultural geography focused on outdoor recreation. Two social research projects are carried out in the area, looking into the importance of social capital for growth, and communicative strategies which stimulate increased entrepreneurship within nature conservation in farming. Today, there is no joint programme for research on the proposed biosphere reserve. In the long term, a research coordinator may be appointed with responsibility for communication between research projects that relate to the biosphere reserve and for a database covering completed and ongoing research projects.

Environmental monitoring activities directly linked to lakes and watercourses, air and forests have been carried out in the proposed biosphere reserve over a long period. There are, for example, thorough inventories of meadows and grazing land, and of pastureland, wetland and bird skerry flora. Water chemistry, precipitation chemistry and air quality are continuously monitored on a yearly basis, as are the bottom sediments, zooplankton/phytoplankton and bottom fauna of Lake Vänern. Echo-counting of certain fish species, electric fishing, commercial catch statistics and smolt tagging provide an indication of the population trends among Lake Vänern fish. This, together with other environmental monitoring activities that have been carried out for many years, has led to the creation of a large knowledge bank.

There is a good range of public information relating to the proposed biosphere reserve, and there are a number of initiatives for environmental education and other activities that aim to increase awareness among the public and/or special groups. The municipalities, county administrative board, etc. offer work experience programmes, and a number of students have carried out projects and degree projects relating to the proposed biosphere reserve with support from the biosphere reserve coordinator. Educational programmes for upper secondary schools and higher education have been developed in collaboration with the proposed biosphere reserve. In future, the biosphere reserve office will continue to initiate and support education and training initiatives for groups of all ages and for people of different backgrounds, and to develop and support projects that lead to increased knowledge about how humans can better relate to their surroundings.

5. ENDORESEMENTS

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

For Natura 2000 sites, nature reserves and national park:
Institution: **Swedish Environmental Protection Agency (EPA)**

Full name: Eva Smith

Title: Acting - Director - General

Date: 08 12 18

Institution: **County Administrative Board of Västra Götaland**

Full name: Göran Bengtsson

Title: Dep. governor

Date: 08 12 17

For municipal nature reserves:
Institution: **Municipality of Mariestad**

Full name: Lennart Bergqvist

Title: Municipal Director

Date: 2008-12-17

For forest habitat protection areas:
Institution: **Swedish Forest Agency**

Full name: Anders Wiborg

Title: District director

Date: 2008-12-17

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

For Ramsar site and nature conservation area:
Institution: **Swedish Environmental Protection Agency (EPA)**

Full name: Eva Smith

Title: Acting Director - General

Date: 081218

Institution: **County Administrative Board of Västra Götaland**

Full name: Göran Bengtsson

Title: Dep. governor

Date: 081217

For areas of national interest for the purpose of cultural heritage and nature conservation, and shore protection areas:
Institution: **Municipality of Götene**

Full name: Gert Rahm

Title: Manager Town Planning Office

Date: 16 December 2008

Institution: **Municipality of Lidköping**

Full name: Kristina Lundgren

Title: Infrastructure director

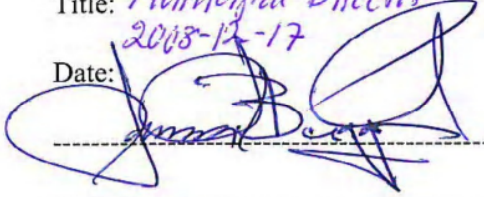
Date: 16 december 2008

Institution: **Municipality of Mariestad**

Full name: Lennart Bergquist

Title: Municipal Director

Date: 2008-12-17



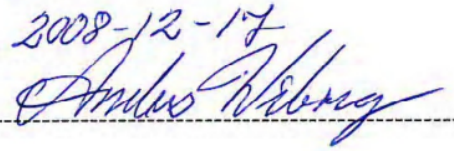
For forests with nature conservation agreements:

Institution: **Swedish Forest Agency**

Full name: Anders Wiborg

Title: District director

Date: 2008-12-17



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

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.

See above, Chapters 5.1 and 5.2.

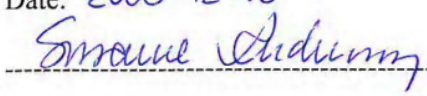
5.4 Signed by the authority/authorities, elected local government recognized authority or spokesperson representative of the communities located in the transition area:

Institution: **Municipality of Götene**

Full name: Susanne Andersson

Title: Chairperson of municipal council

Date: 2008-12-16



Institution: **Municipality of Lidköping**

Full name: Marita Dengtsson

Title: Chairperson of the municipal council

Date: 17 dec. 2008

Marita Dengtsson

Institution: **Municipality of Mariestad**

Full name: Ulla Göthager

Title: Mayor of the municipal councie

Date: 2008-12-17

Ulla Göthager

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

Full name: Lars M Nilsson

Title: Chair

Date: 18 December 2008.

PART II : DESCRIPTION

6. LOCATION (LATITUDE AND LONGITUDE):

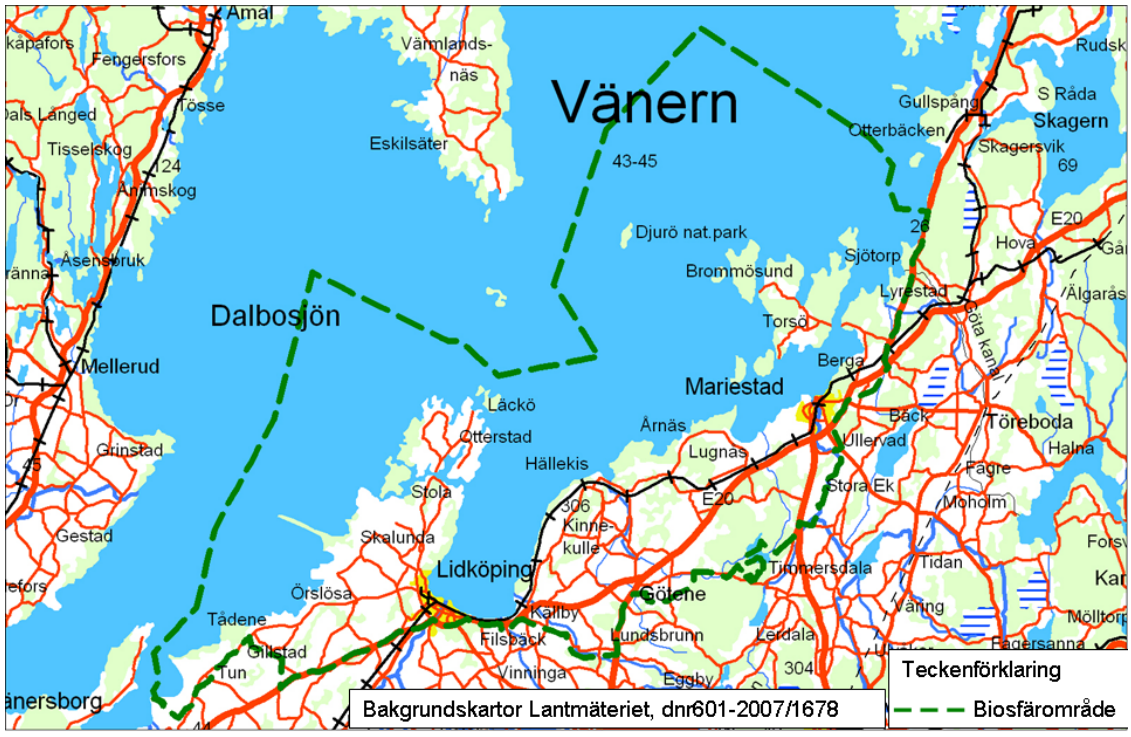
[Indicate in degrees - minutes, seconds the coordinates of the central point AND the external limits of the proposed biosphere reserve to be used for a Geographic Information System (GIS)]

Biosphere Reserve central point:

In Lake Vänern	58°43’44’’ N, 13°19’16’’ E

Biosphere Reserve – external limits:

Northern limit:	59°03’33’’ N, 13°35’28’’ E
Eastern limit:	58°53’29’’ N, 14°01’00’’ E
Southern limit:	58°23’22’’ N, 12°41’41’’ E
Western limit:	58°24’48’’ N, 12°38’47’’ E



Map 1: Extent of the Biosphere Reserve
The Biosphere Reserve includes the south-eastern part of Lake Vänern and its archipelago as well as Mount Kinnekulle and Mount Lungåsberget, parts of the ravine systems of the rivers Lidan and Mariedalsån, and the eastern part of Lake Dättern.

7. AREA (see map):

Total: 278,600 ha

7.1 Size of terrestrial Core Area(s): 2,709 ha;
If appropriate, size of limnological Core Area(s); 13,572 ha.

7.2 Size of terrestrial Buffer Zone(s): 20,698 ha;
If appropriate, size of limnological Buffer Zone(s); 4,120 ha.
Size of Buffer Zones that are both terrestrial and limnological: 16,058 ha

7.3 Approx. size of terrestrial Transition Area(s) (if applicable): 64,000 ha;
If appropriate, approx. size of limnological Transition Area(s); 157,443 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 coexists with the requirements of the biosphere reserve zonation system:

The zonation of the proposed biosphere reserve is based on the national zonation model and has been developed and adapted according to local conditions by a working group. The focus has been to create a flexible and dynamic instrument to serve as a guideline for physical planning in the area. Furthermore, the zonation has been developed to include a variety of productive landscapes, from coastal and archipelago areas to old-growth forest and calcareous grassland, etc. The aim of this zonation is to create a model for sustainable communities, expressing the relationship between humans and their surroundings.

The proposed biosphere reserve is divided into three zones, each with a different purpose: core area, buffer zone and transition area (see Appendix 2).

Core areas are legally protected with the aim to conserve natural and recreational values. Core areas in the proposed biosphere reserve are protected under national legislation as Natura 2000 areas, nature reserves, national park, municipal reserves and forest habitat protection areas, constituting strong protection for the conservation of biological diversity. The core areas are highly productive landscapes with regards to ecosystem services, and they have significant conservation values and high biodiversity. Long-term management and monitoring of core areas will provide valuable information that can be used for research and education. Activities in core areas are limited by restrictions in the above-mentioned protection areas.

Buffer zones surround or link the core areas. Activities and the use of resources that are in accordance with the protection of core areas are encouraged. In the proposed biosphere reserve, the buffer zones coincide with areas of national interest for the purpose of nature conservation and conservation of the cultural environment, nature conservation areas, Ramsar site, shore protection areas and forest with nature conservation agreements. Activities in buffer zones are limited by restrictions in the above-mentioned protection areas.

The transition area consists of the outer zone of the proposed biosphere reserve. Locally supported and long-term sustainable development work is prioritised in this zone.

Mount Kinnekulle – an exception
Mount Kinnekulle is an area of highly valuable natural and cultural environments, which is also reflected in the number of protection and conservation areas covering the plateau mountain (national interests, conservation area, Natura 2000 site and nature reserves). The entire plateau mountain is a Natura 2000 site (7,125 ha) and includes several of the biotopes and species that are especially important to protect from a European perspective. The Natura 2000 habitats coincide with the nature reserves. In the proposed biosphere reserve, the entire plateau has been zoned as a buffer zone, according to the boundary for national interest for the purpose of conservation of the cultural environment, while the 19 nature reserves are core areas. This zonation makes Mount Kinnekulle into an exceptional national demonstration model of biosphere reserve zonation where several core areas are surrounded by a continuous buffer zone. The proposed biosphere reserve aims to develop a model for physical planning based on sustainable ecological community planning, where the relationship between core areas and buffer zone is made concrete. In this way, Mount Kinnekulle constitutes a pedagogical example of how land use, conservation and utilisation can be combined through such biosphere zonation.

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.]

UNESCO def: Temperate and sub-polar broadleaf forests of woodlands
EU def: Boreal 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]

Geology
Characteristic for the geology in the proposed biosphere reserve is the dominant gneiss interspersed with sedimentary rock, mainly limestone and sandstone.

The inland ice has created a fertile soil with thick layers of fluvioglacial clay and other coarser moraines. The land is mainly low-lying with the exception of Mount Kinnekulle, Mount Lugnåsberget and a few moraine ridges. Not least Mount Kinnekulle has played, and still plays, a major part in the mental landscape. The plateau is visible in the entire area, and widely around Lake Vänern. Old names for the mountain, e.g. *the Kinne Farmer*, were a way of handling the powers of nature in a magical way.

Prehistoric times (5,000 BC – ca 1,000 AD)

The first people

The first people appeared in western Sweden around 11,000 years ago, according to new findings. These findings are from the west coast of Sweden and indicate that the first humans came to the Lake Vänern area in search of seasonal food. During winter, the coast offered more tolerable living conditions. One of the oldest known settlements is around 7,000 years old (Kilja in the outskirts of the area, Karaby parish). Traces found from the earliest inhabitants in the area include tools and weapons made by these hunter-gatherers. There are also areas just outside the proposed biosphere reserve, where people settled or lived during longer periods. These areas include Lake Dättern and the lowland lakes Hullsjön and Hornborgarsjön, whose extent and water level have changed over time.

The areas within the proposed biosphere reserve with the most fixed ancient monuments are those with the highest percentage of clay soil. One example is the western side of Torsö, adjacent to the lowlands that have periodically been under water and that separated the islands of Torsö and Fågelö.

Ancient agriculture

During the Neolithic period (4200 BC – 1800 AD) people started 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 mainly 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 (1800 BC – 500 AD), when cultivation also spread to areas far beyond those farmed today.

During the Early Iron Age (500 BC – 400 AD) farming practices changed significantly; fields were made permanent and animals were beginning to be stabled. Stabling made cattle-farming more efficient. It kept the animals dry and warm, which increased the milk yields; contented cows were also easier to milk. The feed supply was more even; snow made it difficult to find grass in the winter. Conditions were made worse in over-grazed areas where there was a shortage of shrubs. Finally, manure handling was made easier, which facilitated the fertilising of permanent fields. Increased need for winter fodder led to the gathering and drying of hay and leaves. The “meadow is the mother of the field” – the agriculture we know from the so called agrarian society was born.

Place names

The area displays the general types of place names in western Sweden. There is a clear element of place names including the name of gods (teophoric names); Frös-, Odens (Ons-), Tors-, etc., not least linked to Lake Vänern. There is a marked similarity to Norwegian place names (also applies to general language characteristics), which can be traced around Lake Vänern in the common “älv-“ names for river courses, e.g. Gullspångsälven (just north of Mariestad municipality). The use of “älv” is most common in the county of Värmland, but even the river Lidan in the town of Lidköping is called *Älva* (the River). Älva is also the traditional name for the river Göta Älv.

There are some details that differ between the municipalities of Mariestad and Götene compared to Lidköping municipality, for example when it comes to the occurrence of names including the word “säter” (in the sense *outmark grazing)*, which appears in a number of place names, more or less limited to the area of Mount Nordbillingen - Mount Kinnekulle and between the large lakes to the north of this area. This type of “säter” names are particularly common in the counties of Södermanland and Östergötland,

located north and east of the proposed biosphere reserve.This is one of several examples that point to contacts to the north and to the east in the northernmost area of Västergötland.

The age of the village landscape (ca 1000 AD – 1800 AD)

Political history
Sweden did not become a unified country until during the reign of Gustav Vasa; before then, Västergötland was an area marked by disputes. Both Denmark and Norway had interests here, but there were also more private family interests that from the early Middle Ages resulted in a number of acts of war. Two families with their seat here were Aranäs (Årnäs, Forshem parish) and Lindholmen (Strö parish).

The landscape lies exposed (or strategically) between central Sweden and the above-mentioned countries. It is known that Norwegian kings made claims on Dalsland and Värmland on the western and eastern parts of Lake Vänern.

The first known establishments by the Swedish Crown were the so called Uppsala öd (Old Norse *audr* = domains or wealth), or royal estates (kungsgårdar) and villages (husbyar). In the proposed biosphere reserve there are a number of such estates or villages e.g. Husaby; Vad and Tunaholm ; and Rackeby Storegården . These were points of support for the Crown during the Iron Age- early Middle Ages. During this period, Västergötland was divided into “bon” (estates), e.g. Vadsbo, Skalunda bo and Kinda bo. The county consisted of eight “bon” which each encompassed several hundreds (härader).

The *Vasa Age* is strongly marked in the proposed biosphere reserve with the Duke Karl IX duchy, which included Vadsbo hundred. Läckö Castle was rebuilt as a Vasa stronghold, and Gustav Vasa and his sons acquired a number of estates in the area. The duchy, which included e.g. Värmland, Närke and Vadsbo, developed a number of activities that are typical of the Lake Vänern area: iron industry in eastern Värmland-western Närke and trade in forest products; mast wood and other coarse timber was in great demand in Europe. Mariestad and Karlstad were founded in the late 1500s as administrative cities within the duchy.

Church
Activities by the Catholic Church were hugely significant in this area and all around Lake Vänern. Skara diocese dominated the three counties around the big lake and influenced all aspects of society. The Cistercian monasteries in Varnhem and Gudhem were great landowners with influence over farming, fishing, crafts, trade, etc. Varnhem monastery owned more than 200 farms, mills, fishing waters, etc.

The church, religion and the episcopate power in Skara has also left strong marks in the human conscience, and the area is still highly religious. Opposition to the reformation was, naturally, strong in Västergötland. The popular Maria cult, for example, lived on in the area long after the reformation. A great number of Roman church buildings are preserved as living symbols of the deeply rooted villages and societies.

Settlements

Farm villages
At the end of the Iron Age and the dawning of the Middle Ages, buildings and settlements were established in locations where they remained until the great 19th century enclosure reforms. Villages were the natural units on the plains, whereas single farms occurred in areas that were more difficult to farm. Until the enclosures, village land was divided into infields and outlying fields. Infields were directly adjacent to the villages or farms. They were farmed intensively and consisted of arable fields and hay meadows. The infields were fenced in order to protect them against the livestock, which grazed freely in the outfields and fallow land. The outfields consisted of forest and pastureland on the fringes of villages and farms. The outfields included skerries, islets and islands, except for the largest islands. Characteristic for the village landscape was the total utilisation by people of all parts of the landscape.

Cattle farming
From the late Middle Ages and onwards a highly dominant cattle farming developed, which culminated in the 17th century. But even in the early 1800s, Västergötland had the highest cattle density in the country. From the plain south of Lake Vänern with its large areas of grazing and meadows, large herds of cattle were driven to the north and to the south.

During this period, large meadows were created which were a prerequisite for both cattle farming and agriculture. Livestock was stabled during the winter and required large amounts of hay. In the southern part of the Lake Vänern area there was also a good supply of hay from wet grassland from the lake shores and the large areas of wetland. In addition, reeds were used as winter fodder. Reeds were also used for roofing. Buildings known as “krake” (fishing shed or outhouse) are highly characteristic for the Lake Vänern shore in Kålland hundred. Manure from livestock that had been kept indoors over winter was spread on the fields in the spring. Identified sheepfolds in the area demonstrate the importance of animal manure. A few sheep were kept in a mobile hut and transported to grazing areas that needed fertilising.

The importance of cattle farming in Västergötland is also demonstrated by the fact that until the 1780s, the biggest cattle market in the country was held in Hova, near the border to Närke and Svealand, both north of the proposed biosphere reserve.

Agriculture
For a very long period fields lacked fertility. One remedy was to let some of the fields lay fallow. In the south-western part of the proposed biosphere reserve half the land generally lay fallow, while in the Mount Kinnekulle area a third of the fields were left uncultivated. In the northern part of the Biosphere Reserve, both rotation systems were used. These practices largely remained from the Middle Ages until the enclosure reforms in the 18th and 19th centuries. Arable land was divided into two or three fields. One of the fields lay fallow every year, while the other/others were cultivated. Next year, the other field lay fallow. In this way, half or a third of the fields were fallow every year, providing valuable grazing. The farmers’ strips were mixed so that all farmers had part of all the land. In Uppland, for example, the land was divided by “solskifte” (sunwise division of land), i.e. the relative position and width of the strips of land were governed by the size and location of the farms in the village. This strictly regulated division was never carried out in Västergötland. Here, the order and size of the strips were totally irregular.

By the 18th century large parts of the plains south of Lake Vänern were cultivated. Naturally, large variations had occurred in the area, especially between the plains and the more broken landscape. One advantage for the then farmers along the shores of Lake Vänern was that the level of the lake varied so that grasslands were flooded regularly. This natural fertilising was then important for the farmer and his

animals as well as for the landscape itself.

Impoverished landscape
By the end of the Middle Ages, most forests and woodlands in Västergötland had disappeared. Some forests were cleared already by the end of the Iron Age. Intensive grazing led to reduced stands and strictly limited re-growth of new trees. From the 17th century, increased demand for grain, much of it to the mining district north of Lake Vänern, led to the cultivation of meadows. This resulted in the balance between fields and meadows being disturbed and the soils became even more impoverished.

City/town
The proposed biosphere reserve includes two cities/towns with completely different history, which certainly adds an interesting quality to the area.

Mariestad (founded in 1583) in the north east end of the proposed biosphere reserve is, and to a greater extent was, an administrative city. Mariestad was an early centre in the southern part of the duchy. The city was named after Duke Karl's wife Maria. Mariestad has a cathedral, but the diocese was presided over by a superintendent rather than a bishop, parallel with the diocese of Skara, even for a time after the duchy ceased. Mariestad has always been characterised by central government (county administrative board and county governor) and regional (county council) administration. Mariestad is still a centre for the old Vadsbo hundred, a name which is still commonly used.

Lidköping, in the south-western part of the proposed biosphere reserve, has a completely different character and history. The town is strategically situated in a junction of roads and waterways. Just east of the town, the ancient road from Skara joins the road from Bergslagen. By the River Lidan, the road meets the lake and the navigable waters of the river. The roads continue to the trading centres along the Göta River and towards the previously Norwegian town of Uddevalla. Lidköping has none of the administrative functions that Mariestad has and has had. *Settlements*,in Lidköping most likely occurred spontaneously along the afore-mentioned roads and junction. The location was favourable for trading, which is demonstrated by the fact that the New Lidköping was built in 1671 opposite the Medieval Lidköping, which helped attract market trade to the new town.

Lidköping is the oldest town (founded in 1446) along Lake Vänern and dominated trade on the eastern side of the lake in the 15th and 16th centuries. Around the town is an extensive trading area from which farmers and others were attracted to the two market squares. Apart from Skara, no other towns have threatened Lidköping's dominance over trade in western Skaraborg.

17th century – Age of nobility
In 17th century estates were formed. The general pattern throughout the country was that of big landowners joining together to form larger units. Land ownership amongst the nobility increased dramatically during this period as a result of the wars in Europe. Previously, the nobility owned a large number of scattered estates, spread out in the landscape and in the country. Manor farms were created after the reign of Gustav Vasa when noblemen acquired the grounds of a whole village through barter. The villagers' homes were demolished and they were forced to move to the outskirts of the village and work as day labourers. Clear examples of this type of manor farm are Storeberg in Tådene parish and Börstorp in Enåsa parish.

It is likely that changes in e.g. farming practices first occurred on and around the large estates. It is possible to follow how innovations and influences spread from farms run by people with contacts in Stockholm and further away in Europe.

Mount Kinnekulle is characterised by the dominance of a number of estates in a way that is not seen

anywhere else within the proposed biosphere reserve. The estates are well preserved; Råbäck is a great example that still shows all the functions of a 17th century estate. Almost all the buildings and facilities have been preserved or renovated, such as the harbour, railroad station, school, shop, farm buildings, etc.

To a certain extent, the proposed biosphere reserve coincides geographically with that of Läckö countship (created in 1615 and reduced in 1682). Läckö countship is the best example in the proposed biosphere reserve of developments that took place during the formation of estates and Sweden's period as a great power. The countship included the area between Vänersnäs to the west and Husaby to the east, and between Kållandsö to the north and Stora Levene to the south. In addition, count De la Gardie also owned a number of estates outside the countship, e.g. Valle hundred by Mount Billingen and Katrineberg in Låstad parish. The most obvious remain of the countship is, however, Nyestan (New Town) in Lidköping, on the western side of the river Lidan.

The age of enclosures (18th and 19th centuries)

End of traditional society

The 18th century saw a change in the approach to the country's economy and also to farming. New ideas in politics and influence from the Enlightenment led to a break with the medieval traditions that had formed traditional agriculture. Enclosure reforms were introduced in the country, where farming was the main industry and 80 per cent of the population lived outside towns, industrial communities, etc. The first legislation for *storskifte* ("great consolidation") came in 1757, *enskifte* ("single farm consolidation") in 1803 and *laga skifte* ("partial consolidation") in 1827. As a result, great changes occurred in the landscape and many villages were fragmented.

On the plains of Västergötland changes were sweeping and the settlement structure today is in many areas characterised by isolated farms. Land from different farms was consolidated into one or a few holdings. During the *laga skifte* many farms were moved out into the surrounding landscape and new patterns of settlement arose.

The concept of infield and outfield, in principle, disappeared. Fields became fewer and considerable larger than before and the area developed into a fully cultivated landscape. The 18th century countryside in which almost three-quarters of the land had been used for pasture and hay meadows changed dramatically through the enclosures. The villages' most productive fodder-producing areas were cultivated, while the rest of the land was given over to more intensive exploitation. Large-scale cultivation of new arable areas and changes to farming had not been possible without a number of technological innovations. A big population increase was one determining factor and industrial manufacturing was the other. The modernisation of agriculture, including land reforms, freed people from the agricultural production and created large migrations. Emigration and urbanisation were two effects from this development.

Increased demand for timber for paper pulp and other wood products in the late 19th century led to demands for greater returns from the forest. This ended the practice of letting animals graze in the forest and woodland pastures have, in principle, disappeared.

Oat era (ca 1840-1890)

The reshaping of society continued in the 19th century. Many influences from Europe and new inventions went hand-in-hand with liberalisation of society and economy. Crop rotation including nitrogen-fixing plants, tile drainage, more efficient ploughs, and towards the end of the century even fertilisers, are some

examples of major innovations in farming at that time. Greatly due to changing British trade legislation it became favourable to export oats to Great Britain, and also for the millions of horses used in the growing transport services in the rest of Western Europe. In Skaraborg, mainly in the western part, practically all available land was used for growing oats. This resulted in a radical reduction in the use of meadows, as fodder was now grown on artificially fertilised pastures.

The start of the American Civil War in the 1860s put an end to exports to Europe, which favoured the Swedish export of oats. Shipping was also transformed during this period, with new and bigger ships (e.g. propeller-driven steamers), the modernisation of harbours, and the expansion of lighthouses in Lake Vänern. For a few years in the 1870s, Lidköping was the third largest export port for oats in the country, despite the so called "oat-line" railroad between Herrljunga and Uddevalla which was completed in 1867. In 1879, Lidköping was granted staple rights with a shipping office, customs and direct export to markets around the world. At Bergatorp north of Mariestad, Charles Emil Löfvenskiöld created a widely spread architectural style, especially for farm buildings, that are a fitting symbol for the radical changes to agriculture in Skaraborg during this period.

20th century

During the 20th century, Sweden was marked by heavy industrialisation and a migration of people to densely populated areas, which also applies to the proposed biosphere reserve. Democratisation created new rules on e.g. the labour market, which benefited the development.

Agriculture

Industrialisation in the 20th century also covers agriculture. The development started in the 19th century and continued with the mechanisation of farms. Enclosures left many people in the area outside their natural environment, approximately between 1830 and 1875. Many chose to emigrate, but those who stayed tended to move to the growing towns and emerging industries.

Agriculture underwent several heavy waves of rationalisation, e.g. after the Second World War and in the 1960s. Arable land still dominates in the proposed biosphere reserve, but today forest occupies a bigger part than it has for centuries. The area also has a larger percentage of people employed in farming and related sectors (e.g. food industry) than in other parts of the country.

Forest

Forest plantation commenced in the second half of the 19th century, mainly on the initiative of the large estates. Swedish forest legislation from 1903 decreed reforestation, which started a development that has resulted in more forest in the country than in a thousand years. Old agricultural land has been forested, and although the plains are still wide open there is an interspersion of stretches of woodland that were not there a few hundred years ago.

The end of the 19th century saw the construction of a great number of pulp and paper mills in the Lake Vänern area. Only a few remain today, but over the past hundred years or so, huge volumes of forest raw materials have been consumed in Värmland and Dalsland. Within the proposed biosphere reserve, the pulp and paper mill in Mariestad is the only one of its kind. It was established already in the 18th century, and has been in use as a modern pulp and paper mill since the mid-19th century. Katrinefors paper and pulp mill previously owned a number of forest properties, mostly in Värmland but also in the proposed biosphere reserve, e.g. on the island of Torsö and in Traneberg on the island of Kållandsö.

Industry in the area

Shipping

Inland shipping
Shipping in some form or other has almost certainly taken place on Lake Vänern as long as people have lived here. The area has long been an archipelago landscape, periodically more so as the water level in the lake has varied significantly. People have made their way to the islands and erected prehistoric monuments even in areas that were not colonised.

From the end of the Middle Ages up until the 18th century, shipping, like other industries, was more traditional and formed an integrated part of the village community. Small and large boats were used to transport own goods to various markets. Between the northern and southern areas around Lake Vänern, iron and timber were exchanged for agricultural products. Until the 1840's shipping was predominantly carried out on the lake itself (although the first section of the Trollhättan Canal opened in 1800 and Göta Canal opened in 1832).

New era
In the 1850s, village community boats disappeared from estate inventories as they were replaced by steamboat companies. During the rest of the 19th century, sailing ships held their own (in tonnage), but thereafter the use of steamboats escalated rapidly. On Lake Vänern, however, as in many other coastal communities around the country, many of the sailing ships lived on. It is true that most of them were fitted with engines, but many ships that were considered small at the time of the Trollhättan Canal modernisation in 1916 (2,200 tonnes) were still in use. Sailing ships were extensively used during the Second World War and became popular again in times of fuel shortages. In the 1950s there were still many old sailing ships with a tonnage of 80-200. Although competition with road transport was by then considerable, such ships were cheap to buy (second hand tonnage).

Shipbuilding
Thousands of traditional boats and ships were built along the shores of Lake Vänern until the 1940s. Most of them were built in suitable places by the water, where they could be launched. But more than 500 craft were built at regular shipbuilding yards. From the creation of Göta Canal and up until around 30 years ago, shipbuilders leased premises from the AB Göta Canal Company. Here they built traditional sailing and motorised boats and in the last decades more modern ships, mainly for the Swedish market but also for Europe. At the Trellevarvet shipbuilding yard (Kållandsö) a few new ships have been built and a great number of craft have been rebuilt and repaired since 1945. This shipbuilding yard is still operating and is the only yard that can serve the biggest ships on Lake Vänern.

Stone working
Two of Västergötland's best known plateau mountains are located within the proposed biosphere reserve. Quarrying at Mount Kinnekulle and Mount Lugnåsberget has taken place since the Middle Ages providing an important industry in the area.

Mount Kinnekulle
A good example of stone quarried at Mount Kinnekulle is the sandstone used in the Roman churches located in a number of areas around the mountain. A large sandstone quarry is found at Halla, near c well-

known Husaby church. The sandstone churches are concentrated to one area, but there are a remarkable number of baptismal fonts of the Västergötland type cut in sandstone around Lake Vänern and in other places. Quarrying and burning of limestone, mainly for mortar and cement, building and decorative stone, are the most evident stone workings at Mount Kinnekulle. Most of the limestone that was burnt came from deposits intermixed with layers of alum shale. This combination of raw material was useful when wood supplies ended in the late 19th century and were replaced by shale.

Small limestone quarries are common and clearly visible around Mount Kinnekulle, for example just above Västerplana, which provided the materials for Mariestad cathedral. Cementa's quarry Stora brottet dominates the landscape on the western side of the mountain. Limestone for cement manufacturing was quarried here from 1892. Since the quarry closed in 1979, only one small company remains working Mount Kinnekulle stone.

Mount Lugnåsberget
This mountain is renowned in Sweden, and outside the country, for the many millstones that have been quarried here. From the Middle Ages until 1919, stones were quarried from gneiss in the underground mine, supplying the large number of mills, not least in Västergötland. The millstones were sold in Sweden and abroad, e.g. to Germany. According to tradition the first millstones were made by Cistercian monks; yet another example of the church's influence on the landscape.

10. HUMAN POPULATION OF PROPOSED BIOSPHERE RESERVE:

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

permanently / seasonally

10.1 Core Area(s): ____7_____ / _____?_____

10.2 Buffer Zone(s): ___9,280_____ / _____?_____

10.3 Transition Area(s): ____50, 274__ / ____?_____

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 most densely populated areas within the proposed biosphere reserve are linked to the three largest population centres Götene, Lidköping and Mariestad. Lidköping and Mariestad are located on the shores of Lake Vänern, while Götene is situated along the European Route E20.

Industry in Götene consists mainly of small enterprises. A wide range of companies account for 50 per cent of employment in the town. The food industry is the single largest sector and provides half of the jobs within industry. Other sectors include wooden houses, plastics, engineering, mineral wool, graphics,

cement, stone and animal feed. Lundsbrunn Conference and Spa located in Götene municipality is one of the largest of its kind in western Sweden. The cultural climate that has been created around Mount Kinnekulle offers inspiration to many artists. The land area of Götene municipality is 62,573 ha and the population is 12,879 (Statistics Sweden, 1 Sept 2008).

Lidköping is located in the western part of the proposed biosphere reserve, on the shores of Kinneviken bay and framed by an agricultural landscape. Shipping has played an important role in the development of the town. The early timber export from the forests around Lake Vänern transformed Lidköping from an inland town to a port town. The proximity to the lake and to open landscape has helped Lidköping develop its industries to include both shipping companies and agriculture. Today, the town has a varied economy with predominantly small and middle size enterprises. There is a strong manufacturing industry dominated by plastics, food and engineering. Spiken fishing village, on Kållandsö, is home to the largest fishing fleet on Lake Vänern. Spiken and Läckö Castle are the biggest tourist attractions in Lidköping. The land area of Lidköping municipality is 137,843 ha and the population is 37,380 (Statistics Sweden, 1 Sept 2008).

Mariestad, located in the northern part of the proposed biosphere reserve, was previously the seat of the county government in Skaraborg county. The city's economy is characterised by industry and trade. Mariestad is a popular summer tourist resort and attracts mainly boating people from the surrounding Lake Vänern archipelago. The main attractions include the Old Town, one of Sweden's best preserved city centres, and Göta Canal, one the best-known tourist attraction in the country. Mariestad also has one of the oldest and best preserved provincial theatres in the country, Mariestad Theatre which opened in 1843. The theatre was declared a listed building in 1993. Today, the city is enjoying strong expansion through new housing developments and lakeside housing. The land area of Mariestad municipality is 150,979 ha and the population is 23,895 (Statistics Sweden, 1 Sept 2008).

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

Skövde: The biggest town in northern Västergötland, located approximately 20 km south of the proposed biosphere reserve. Population: approximately 50,000.

Göteborg: The county seat of Västra Götaland, located approximately 100 km south-west of the proposed biosphere reserve. Population: approximately 500,000 people; 900,000 in the Greater-Göteborg area.

Stockholm: Capital of Sweden, located approximately 300 km north-east of the proposed biosphere reserve. Population: approximately 780,000; 1,900,000 in the Greater-Stockholm area.

10.6. Cultural significance:

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

Prehistoric times

The proposed biosphere reserve is an area rich in cultural traditions with traces of human activities dating back 10,000 years. People migrated here from the south soon after the withdrawal of the Inland Ice. During the Early Stone Age, people were active along the shores of Lake Vänern. The first humans here were seasonal settlers and consisted of family groups that lived on hunting and fishing. The early hunting-

gathering culture transferred into farming communities in the Late Stone Age. The great transition from natural to cultural landscape began around 3000 BC.

The use of bronze was widespread around 1800 BC. The Kålland peninsula and Mount Kinnekulle appear to be the major Bronze Age settlement areas. Kålland's rich Bronze Age culture has been substantiated by recent discoveries of previously unknown remains, not least rock carvings. An exceptional discovery of a large number of bronze shields was made at Fröslunda on Kålland.

Christianity and churches

Västergötland was the first of the old Swedish counties to become Christian. According to legend, Sweden's first king, Olof Skötkonung, was baptised in Husaby just after year 1000. Husaby Church was also the seat of the first Swedish bishop.

A period of intensive church building had begun; the first churches were made of wood, but from the 12th century they were built in stone, using both sandstone and limestone from e.g. Mount Kinnekulle. Local stone was also used for baptismal fonts and gravestones. Despite the destruction of churches during the Late Middle Ages and in the 19th century, many of these medieval churches have been preserved until today.

The growth of cities/towns

The earliest towns were created during late prehistoric times/early Middle Ages. Out of Västra Götaland's seven towns, Skara, Falköping, Hjo and Lidköping date back to the Middle Ages. Of these, only Lidköping is located within the proposed biosphere reserve, and was once two separate towns, divided by the river Lidan. The old medieval town was chartered in 1446. The town is likely to have originated from a strategic trading post and prospered as a trading centre in the 16th century when shipping flourished on Lake Vänern. Until the 1580s, Lidköping was the only town along Lake Vänern.

Duke Magnus Gabriel de la Gardie at Läckö Castle had the right to found a town in his countship and in 1670, New Lidköping received its charters. The town was planned according to the ideals of the time with a grid of rectangular streets and blocks, and a large market square for trade and shipping by the river. The two towns were unified in 1683. Lidköping was a centre for trade and crafts until the 1870s, when intense industrialisation in the early 20th century led to a rapid growth.

Mariestad was founded in 1583 by Duke Karl, who named the city after his wife, Marie of Pfalz. Through its location, where the river Tidan discharges into Lake Vänern, Mariestad became a major trading centre in the duchy. Duke Karl, who later became King Karl IX, realised the value of ports around Lake Vänern for stimulating trade. Water, both Lake Vänern and the river Tidan, played a central role in the continuing development of the city.

Mariestad has many well preserved wooden buildings, which reflect the differing town planning policies from the time of Duke Karl through to the 17th century and late 19th century. Of special interest are the Cathedral and the irregular quarters north of this building, the rectangular grid pattern of streets resulting from the town plan changes in 1693, and the small-scale wooden buildings with well-preserved backyards from the 18th and 19th centuries.

Villages and agriculture

The ancient Elder Westrogothic law described how villages were organised. They were mostly so called cluster villages built around an open place or enclosure. From the late Middle Ages, farming in Västergötland was greatly centred on animal production. Exports from the countryside included butter,

hides, horses and oxen.

Changes in the agricultural landscape between 1750 and 1850 were enabled by enclosure reforms and ditching, as well as improved farm implements and methods of cultivation. Meadows and pastures were now given over to grain cultivation.

The *laga skifte* reform in 1827 resulted in farm buildings moving from the village out to new consolidated holdings. The changes were not so dramatic everywhere. On Mount Kinnekulle and the Kålland peninsula, for example, fields are smaller and stone fences and clearance cairns have been preserved to a greater extent. Animal and pasture husbandry were more common in these areas. Changes to agriculture in the 19th century made it possible to feed the growing population.

From works to industry

Industry in the area is characterised by activities linked to Mount Kinnekulle, including alum and lime works and stone-cutting. A large part of the country's lime industry has been located on Mount Kinnekulle. Lime-burning dating back to the Middle Ages was not industrialised until the mid-1800s, and the same applies to the working of limestone and sandstone. Distilleries, dairies and mills were mainly located in the countryside, often linked to activities on the large estates.

Communications improved during the 19th century, first with of the opening of Göta Canal through the county in 1822, and later with the railroads. The railroads were of great importance for the development of heavy industry within the county and also led to the rise of a number of new villages around the stations, with shops, small enterprises, warehouses, premises for popular movements and housing.

Manor house environments

Many of the manor houses in the area date back to the Middle Ages. Large estates were, naturally, created during Sweden's period as a great power, mainly through the feudal system of enfeoffment whereby the nobility was given land by the Crown in exchange for a pledge of service. Within the area, in the then county of Skaraborg, the biggest landowner was the De la Gardie family with the countship of Läckö. The period from 1650 until the reduction in the 1680s saw a culmination of vernacular architecture, mainly through count Magnus De la Gardie's buildings projects. His main accomplishment was the completion of Läckö Castle and the building of Mariedal Castle.

After the reduction, artists engaged by De la Gardie sought other commissions in manors and churches, which resulted in the many baroque painted ceilings by the so called Läckö School. The reduction also resulted in decreased landownership by the nobility in the country as a whole. Measures taken during the reduction governed the number and design of manor houses during the next century. The more stylish manor houses in the county date back to the 18th century. As it became increasingly common for landowners to live on their estates, they became more interested in the design of their houses and the management of the farms. Among the early 18th century manor houses, Stola on Kålland is especially noteworthy.

Navigation on Lake Vänern

The big increase in navigation on Lake Vänern in the 1850s resulted in the building of a great number of manned lighthouses at major shipping lanes and ports, e.g. Lidköping, Kållandsö and on Brommö. Lighthouses were largely de-manned in the 1940s and '50s, when the last oil-fired lighthouses were replaced by gas.

The 19th century was a peak time for navigation on Lake Vänern. The construction of the Trollhättan

Canal and Göta Canal linked Lake Vänern with the West Coast and the Baltic Sea. During this period, large harbours were built with entrance fairways and stone piers and quays, e.g. at Lidköping and Sjötorp canal harbour. The boom in oat export from western Sweden, which coincided well with the 1844 canal route, was a great boost to navigation on Lake Vänern. Trade in grain soon took dominance over the more traditional exchange trade and exceeded the export of iron in the 1860s. Some 400,000 barrels of grain, predominantly oats, were exported from the county in 1860. Lidköping became the largest shipping port for grain.

Fishing in Lake Vänern

Today, Lake Vänern is home to the biggest freshwater fishing activities within the European Union. Spiken on Kållandsö is also the biggest fishing village in the EU. Lake Vänern has the greatest diversity of fish in Sweden. In the 19th century, perch (*Perca fluviatilis*), pike (*Esox lucius*), pike-perch *(Sander lucioperca),* burbot (*Lota lota*), salmon *(Salmo salar),* common whitefish (*Coregonus lavaretus*) and vendace (*Coregonus albula*) were caught here. Bream (*Abramis brama*), ide (*Leuciscus idus),* roach *(Rutilus rutilus)* smelt *(Osmerus eperlanus)* and eel *(Anguilla anguilla)* were also caught. Early winter fishing of burbot *(Lota lota)* was important in many places, mainly in the Brommö sound and at Kållandsö.

Kållandsö, Brommö and Torsö are examples of areas where fishing traditionally has played a significant role. Both Kållandsö and Torsö paid tax in salted vendace in Gustav Vasa's time. In general, it can be said that farms along the lake fished for their household requirements and the non-landowning population fished for survival. Fishing had long been the main livelihood for many landless along the coast and in the archipelago. The large estates carried out fishing both for their own requirements and for commercial purposes. Normally, they had designated fishermen among their crofters who had the used of several boats and rowing-boats for this purpose.

Commercial fishing was not properly introduced until the turn of the 20th century. Today, some hundred commercial fishermen are active in the entire Lake Vänern.

Listed buildings

The cultural and historic value of buildings, environments and facilities can be protected by law as listed buildings. The purpose of listing is to protect traces of history that have had great significance for the understanding of today's society and to guarantee people's access to the Swedish cultural heritage. There are 19 listed buildings within the proposed biosphere reserve:

- Hönssäter manor	1979
- Jaquette du Rietz foundation	1979
- Kållängen old courthouse	1995
- Råbäck mechanical stone works	1984
- Ekebo	1987
- Grevehuset (count's residence)	1978
- Lidköping old town hall	1976
- Dean Silvius foundation	1968
- Schougska handelsgården (trading house)	1976
- Stola manor farm	1966/1985
- Villa Giacomina	1979
- Stora Ek manor	1967

- Bakery	1968
- Bertha Pettersson's house	1977
- Prison	1995
- Mariestad old hospital	1981
- Mariestad station house	2005
- Mariestad theatre	1992
- Zachauska gården (private house)	1980

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 proposed biosphere reserve comprises part of the Lake Vänern drainage basin. Lake Vänern is the largest lake in Sweden and the third largest lake in Europe. Almost 63 per cent of the proposed biosphere reserve consists of Lake Vänern.

In the western part of the area is Hindens rev, a long glacial moraine that stretches 5 km into the lake. Hindens rev is part of the so called middle Swedish ice marginal zone, resulting from the receding inland ice 10,000 years ago.

In the central parts of the proposed biosphere reserve is Mount Kinnekulle, Västergötland's highest plateau mountain, and Mount Lugnåsberget, one of the smallest plateau mountains in the county. The area also includes boulder-ridges and sand-ridges. South-west of Mount Kinnekulle is the only species-rich highly calcareous fen outside the lime-rich area, the so called Skebykärret.

The area south and south-west of the plateau mountains consists of relatively flat cultural landscape, dominated by agriculture. Large areas of contiguous forest occur in the archipelago as well as in the southern and eastern parts of the area.

Along the 350 km long Lake Vänern coast there are a number of sites with reed areas and rich birdlife. The largest contiguous reed area is found at Lake Dättern in the south-western part of the area. The islands and skerries in the archipelago include extensive sandy beaches and dunes, rocks, flat-rock pine forest and bilberry spruce forest. Torsö, the largest island in Lake Vänern, is home to a wetland area.

The area includes five rivers of which the two largest, Tidan and Lidan discharge in Lake Vänern at the two largest population centres Lidköping and Mariestad. The three smaller rivers, Friaån, Sjöråsån and Mariedalsån run through the agricultural landscape before discharging in Lake Vänern.

11.1.1 Highest elevation above sea level: _____306__ metres (Mount Kinnekulle)

11.1.2 Lowest elevation above sea level: _____44___ metres (Lake Vänern shoreline)

11.1.3 For coastal/marine areas, maximum depth below mean sea level: _-4_ metres (North of Djuröarna)

11.2. 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.

11.2.1 Average temperature of the warmest month: 16 °C

11.2.2 Average temperature of the coldest month: 3 °C

11.2.3 Mean annual precipitation: 500 mm, recorded at an elevation of 55 metres

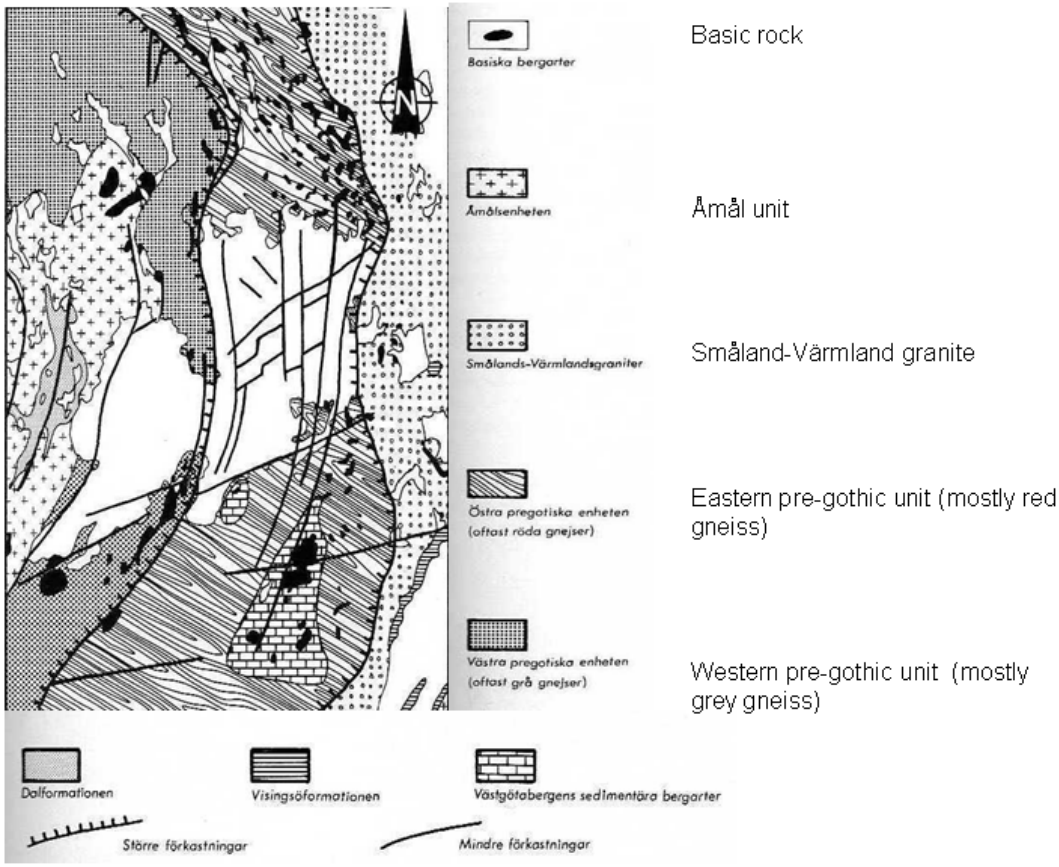
11.2.4 If a meteorological station is in or near the proposed biosphere reserve, indicate the year since when climatic data have been recorded:
a) manually: 1961
b) automatically: 1961
c) Name and location of station: Såtenäs: 58°44' N, 12°71' E

The Swedish Meteorological and Hydrological Institute (SMHI) runs a weather database containing long series of daily observations from weather stations in the area. The database includes temperature, precipitation, wind, humidity, visibility, cloud cover, weather, snow depth, air pressure, sun radiation, etc.

Within the proposed biosphere reserve there are currently two large stations that register various data; Såtenäs and Naven. Mariestad has a station that registers temperature only. Stations that only register precipitation are located at Lidköping and Traneberg (Kållandsö). Mariestad, Såtenäs and Naven also register precipitation. Såtenäs is by far the largest weather station within the area. Here, data is available from 1961 on temperature, precipitation, wind, humidity, visibility, cloud cover, weather, snow depth, air pressure, sun radiation, etc. Observations are made every hour.

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

Parts of Lake Vänern are included in the proposed biosphere reserve. Vänern is the third largest lake in Europe. It covers an area of 5,650 km^2 and has a volume of around 153 billion m^3, and can be considered an inland sea. The biggest part of the Lake Vänern area consists of very old granites and gneisses formed approximately 1,600-2,000 million years ago. The bedrock is largely volcanic rock. There is an older and a younger gneiss series. The borderline between these two layers is a deformation zone, the mylonite zone, which runs from western Värmland along Värmlandsnäs and over to Kållandsö before continuing to the south. The gneisses to the west of the mylonite zone are the oldest, whereas the youngest gneisses are found to the east of the zone. To the west of the mylonite zone, the gneiss is often grey, including that of Kållandsö, down towards Hindens rev and south thereof (see figure below).



To the east, red gneisses dominate. Gneiss that contains a lot of potash feldspar is often red, while gneiss rich in soda-lime feldspar is often grey. Where faults occur, lava has penetrated, and a series of dark-coloured rock species occur in the area, for example south of Lidköping and in Mariestad municipality. This is the mineral hyperite. In the central areas of the proposed biosphere reserve parts of the Archaean rock is covered by sedimentary rock species – Västergötland's plateau mountains. Mount Kinnekulle by Lake Vänern, the most famous of these mountains, with its terraced profile is visible from a wide area. More than 1,500 million years ago Archaean rock was formed from the West Swedish red iron gneiss on which the Kinnekulle area rests. Towards the end of the Archaean era, millions of years of weather and wind had eroded this Archaean mountain to almost base level – the so called sub-Cambrian peneplain. The mountain stands 265 meters above the level of Lake Vänern. The terraced appearance is due to the different hardness of the sedimentary rocks that make up the mountain. Some 545 million years ago, during the Cambrian period, enormous layers of sand were deposited on top of the Archaean rock and which over millions of years metamorphosed into sandstone. Sediments of clay and silt including the remains of plants and animals of the time were deposited on top of the sandstone. This later metamorphosed into different types of shale. Alum shale, rich in organic materials, dominates. The sandstone layer on Mount Kinnekulle is approximately 35 metres and the alum shale layer is approximately 21 metres thick. The alum shale is followed by approximately 15 metres of Ordovician limestone and shale. Some 450-500 million years ago, highly calcareous sediments rich in the remains of

dead animals were deposited on the seabed. The sediments metamorphosed into limestone, which on Mount Kinnekulle is mostly red, although grey limestone also occurs. The dead animals became fossilised. According to the now generally accepted theory of plate tectonics, Mount Kinnekulle was at this time located just south of the then equator and on its way north. Fossils found in the limestone also show that the waters must have been considerably warmer than now, in those areas. The limestone layer on Mount Kinnekulle is 50 metres thick. On top of the limestone, layers of sediment were deposited which metamorphosed into different types of shale, some rich in clay. This layer is now approximately 115 metres thick. The ultimate thickness is unknown, as a few hundred million years later, during the Permian geological unrest, magma forced its way up to the Earth's surface and permeated the layers of shale. As the magma cooled it formed a special type of diabase, known as Kinne diabase. The diabase stratum on Mount Kinnekulle is approximately 25 metres thick.

The nutrious bedrock has resulted in a highly diverse landscape, where arable land, meadows and semi-natural pastures alternate with broadleaf woodland and mixed forest. There are a great many remains of stone quarries and lime-works on Mount Kinnekulle. There are many stone walls, cowsheds and other buildings hewn in limestone. These are remains of the stone industry on the mountain, which was extensive from the 12th century until the mid-1900s.

Lake Vänern was formed when the ice from the last Ice Age melted some 10,000 years ago. The melting of the ice in combination with land uplift provided the basis for what is known as Stor-Vänern (originally, Lake Vänern was approximately twice the sixe of what it is today). The geological landscape in the southern part of this area is strongly marked by the slow retreat of the inland ice. The area contains documented geological values such as Hindens rev, which is part of the middle Swedish ice marginal zone. Geological formations such as the plateau mountains Kinnekulle and Lugnåsberget with their sedimentary species of rock, together with a number of boulder-ridges, drumlins, etc, provide clear evidence of the ice movement that created this grandiose landscape. End moraines found on Torsö outside Mariestad, and glacial striations, cauldrons and shingle beaches found in the archipelago are also results of the inland ice. Drift sand formations are found at the foot of Mount Kinnekulle, between Hällekis and Mariestad, north of Sjötorp, and on Brommö. The sand fields are formed by the wind carrying together fine sand fractions. Loose sediment also formed in the wake of the last Ice Age. The soils consist mainly of clay, sand, gravel and stone. Two types of clay occur in the area; clay that was deposited in the ice sea that once covered the area, and clay that was deposited in Stor-Vänern. The glacial clay, which was deposited in sea water is varved, as opposed to the freshwater clay that was deposited in Stor-Vänern.

References

Thunberg, B. Landin, B 1983 Skärgårdar i Vänern. ISBN 91-518-1653-9

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 Lake Vänern Archipelago and Mount Kinnekulle area contains a number of habitat and land cover types. A selection of habitat and land cover types that in various ways characterise the landscape are described in this chapter. They include:

- Lakes and running water
- Wetlands
- Coastal ecosystems
- Forests
- Arable land
- Built-up areas

The land cover types described are affected by the Swedish national environmental quality objectives. These have been listed for each land cover type. The objectives are further described in Chapter 14.1

DISTRIBUTION

12.1. First type of habitat/land cover: _ Lakes and running water _ See ecosystems below

Lake Vänern is the largest inland lake in Sweden and the third largest in Europe. Lake Vänern has an extensive archipelago with a total of 22,000 islands and skerries. The proposed biosphere reserve includes 4,569 islands that are more than 10 m^2. The Lake Vänern Archipelago and Mount Kinnekulle area is traversed by agricultural rivers. Tidan and Lidan are the two largest rivers, while Friaån and Sjöråsån are somewhat smaller.

National environmental quality objectives
Flourishing Lakes and Streams; Zero Eutrophication; Good-Quality Groundwater; Natural Acidification Only; A Balanced Marine Environment and Flourishing Coastal Areas and Archipelagos; A Rich Diversity of Plant and Animal Life.

Ecosystem: Inland sea (regional)
The proposed biosphere reserve is built around the southern archipelago of Lake Vänern. This freshwater inland sea is thus a dominant feature of the area. The lake also influences the local climate by its evening effect on temperatures in the area. Lake Vänern contains both shallow and deep waters (<20 m) in e.g. the bays Mariestadsfjärden, Forshemsviken, Sjöråsviken and Kinneviken, which exhibit bottom biotopes and coastal zone biotopes. Deep areas of water (>20 m) are found north of Djurö and Brommö and west of Kållandsö. Apart from bottom biotopes, these areas also contain purely pelagic biotopes.

The shores of Lake Vänern are varied, but the most common forms are wet grassland and rocky shores. In addition, there are sandy beaches, rubble formations and drifting sand dunes. This diversity together with the extensive archipelago has resulted in a rich birdlife, and a fish fauna containing 38 species. Lake Vänern is home to unique salmon and brown trout sub-groups, which are a relic from the period following the last Ice Age when the lake was part of the sea.

Ecosystem: Lakes (regional)
On the edge of the proposed biosphere reserve is the nutrient-poor forest lake Vristulven. The shores are mostly stony and rocky and the lake contains many islands and islets of which several are bird protection

areas. Birdlife is rich with breeding osprey *(Pandion haliaetus)*, heron *(ardea cinerea)*, hobby *(Falco subbuteo)*, and black-throated diver *(Gavia arctica).*

Ecosystem: Running water (regional)
The agricultural rivers Friaån, Tidan, Sjöråsån and Lidan discharge into Lake Vänern. As they run through clay plains, they transport big quantities of loose material and are nutrient-rich. They are largely slow-flowing and rich in aquatic vegetation e.g. reeds, rushes and water-lilies. There are also faster-flowing stretches which often include high natural values, such as fish and bottom fauna. The rivers Tidan and Lidan run through urban environments prior to discharging.

12.1.1. Characteristic species:

Group	***Scientific name***	***Common English name***
Vascular plants	*Carex acuta*	Slender Tufted-sedge
	Lysimahia vulgaris	Yellow Loosestrife
	Lythrum salicaria	Purple Loosestrife
	Phragmites australis	Common Reed
Phytoplankton	*Aphanizomenonflos-aquae*	Cynobacteria
	Aulacoseira (genus)	Diatoms
	Cryptomonas	Cryptomonads
	Rhodomonas	Rhodomonads
	Woronichinia naegeliana	Cynobacteria
Submerged plants	*Chara globularis*	Fragile Stonewort (Charales)
	Isoëtes	Quillworts
	I. echinospora	Spring Quillwort
	I. lacustris	Lake Quillwort
	Myriophyllum	Water Milfoil
	M. alterniflorum	Alternate Water-milfoil
	M. sibiricum	Common Water-milfoil
	M. spicatum	Spiked Water-milfoil
	M. verticillatum	Whorled Water-milfoil
	Nitella flexilis	Stonewort
	Nitella opaca	Dark Stonewort
	Potamogeton perfoliatus	Perfoliate Pondweed
Lichens	*Cladina arbuscula*	Reindeer Lichen
	Cladina rangiferina	Grey Reindeer Lichen
	Cladina stellaris	Star-tipped Reindeer Lichen
Crustaceans	*Gammaracanthus lacustris*	No common English name found
	Monoporeia affinis	No common English name found
	Mysis relicta	Opossum Shrimp
	Pallasea quadrispinosa	No common English name found
	Saduria entomon	Aquatic Sowbug
Mammals	*Castor fiber*	Beaver
	Myotis daubentonii	Daubenton's Bat
Birds	*Anser anser*	Greylag Goose
	Falco subbueto	Hobby
	Gavia arctica	Black-Throated Diver
	Larus canus	Common Gull
	Pandion haliaetus	Osprey
	Sterna hirundo	Common Tern
Fishes	*Coregonus albula*	Vendace
	Osmerus eperlanus	Smelt

	Salmo trutta lacustris *Salmo salar* *Salmo salar*	Brown Trout Gullspång Salmon Klarälv Salmon
Molluscs	*Bathomphalus contortus* *Pisidium (genus)*	Twisted Ram's-horn Pea Mussel
Insects	*Ephemera danica* *Ephemera vulgate* *Ephemerella ignite* *Leptophlebiidae vespertin*	No common English name found No common English name found No common English name found No common English name found

12.1.2. Important natural processes:

Water level variations
Water level variations play a major role in Lake Vänern. Meltwater from the Norwegian mountains reaches the lake via the Klarälven river, normally resulting in high water levels during spring. Water levels drop in the summer. Naturally, levels vary from year to year. Freeze-up during winter in combination with high water levels in spring helps to keep the shores and small islets more or less open. High water levels in spring favours zonated wet grassland biotopes.

The watercourses are characterised by a low incident of lakes, which means that the water flow responds quickly to the flux of water from the catchment areas. Naturally, water flow is high in spring and autumn, and low in summer.

Currents
Lake Vänern has two major basins, Dalbosjön and Värmlandssjön. The current circulation in these basins is mainly anti-clockwise. The residence time for water in Lake Vänern is 8-9 years.

The speed of river currents often determines which species can colonise running waters. The proposed biosphere reserve includes both slow-flowing and fast-running waters.

Vegetation encroachment
Lake Vänern has several shallow, protected bays, where sedimentation of fine-grain material and the encroachment of vegetation are natural processes. This results in biotopes with large contiguous areas of aquatic vegetation (mainly reed beds), which eventually become colonised by shrubs and trees. The vegetation often takes on a mosaic-like structure with an interspersion of large areas of open water.

Slow-flowing stretches of river are also affected by the establishment of reeds and rushes. In the long-term, such invasion may change the course of the river.

Oxygenation
The depth of Lake Vänern causes a thermocline in the summer, which prevents the mixing of warm water and cold water. Organisms on the bottom deplete the available oxygen. Overturning of the water occurs during spring and autumn, when the temperature differences are lower.

Rivers have good oxygenation due to the running water. Oxygen levels vary, however, with water temperatures and seasons, and are lowest during summer.

Other processes
Transport and sedimentation of material are important processes for the formation of bottoms in Lake

Vänern and for the course of rivers in the landscape.

- Water residence time in lakes
- Grazing of reeds and rushes by greylag geese
- Flow speed of running water
- Climate (drought, ice movements, etc.)
- Groundwater outflow

12.1.3. Main human impacts:

Regulation of watercourses
Water levels in Lake Vänern have been regulated since the 1930s and the variations are now less than in the natural state. Extreme high and low water levels occur more seldom now, than prior to regulation.

Impacts on watercourses include measures aimed at harnessing power or changing the course of river furrows. Clearances and the straightening of riverbeds have altered the rivers and their flow. Hydropower development has also created obstacles to the migration of local populations of brown trout.

Eutrophication
Lake Vänern has raised levels of nitrogen, whereas phosphorus is considered to occur at natural levels. Some shallow bays, however, may contain high levels of phosphorus, resulting in shallow areas, shores and islets becoming increasingly overgrown. The period from the 1930s until around 1975, saw the spread of reeds and other macrophytes. Since then, this development has more of less halted, although great local variations occur. Within the proposed biosphere reserve, aquatic vegetation has expanded even after 1975 at Brommö and Kållandsö. Otherwise, encroachment after 1975 has mainly been caused by invading shrubs.

The watercourses receive wastewater from built-up areas, which causes raised nutrient-levels. Ditching of wetland areas and an increasing proportion of slow-flowing stretches has led to a reduction of natural water purification. Encroachment leads to a reduction of oxygen concentrations during summer and also hinders the lake migration of fish.

Environmental pollutants

Life in Lake Vänern is still affected by environmental pollutants remaining in the bottom sediment. Environmental pollutants and heavy metals still reach the lake. Endocrine disrupting substances have received increasing attention in recent years.

Traces of pesticides and pharmaceuticals are found in the rivercourses. As they flow through towns and industrial areas, metals and hydrocarbons get into the water through storm-water outfalls.

Acidification
Too low pH values are a threat to many species. Lake Vristulven is affected by unnatural acidification and is limed in order to maintain the natural pH level.

Other impacts

- Lake Vänern provides drinking water for many people in the area.
- Fishing on Lake Vänern has been declared a national interest, and several of the fish species that occur in the lake are fished both for commercial and recreational purposes.

- Lake Vänern is popular for recreational purposes such as swimming and boating.

12.1.4. Relevant management practices:

Ecosystem preservation and fishery conservation
The conservation of naturally spawning fish populations in some cases requires measures to remove obstacles to migration and the restoration of destroyed spawning and nursery areas. Prohibition periods (during spawning) for some species are also required, as well as the development of selective fishing methods.

Reduction of nutrient run-off
Eutrophication results in increased occurrence of algae and aquatic plants in lakes and watercourse. This can lead to encroachment which changes the ecosystems, as well as to oxygen deficiency due to the large amount of decomposing material. Measures to reduce eutrophication include actions to reduce the discharge of nutrients to the water (e.g. improved purification of waste and process water), as well as actions that improve self-purification of watercourses (e.g. the creation of wetlands and the recreation of fast-flowing stretches).

Regulation of water abstraction
Small watercourses can be sensitive to over-abstraction of water for other purposes. Amounts that can be abstracted are regulated by law.

Reduce pollutants
Reduced use of certain substances by society in general is required in order to curb the concentration of pollutants in organisms and ecosystems. The EU Water Framework Directive has made a priority list of dangerous substances on which the on-going status classification is based.

Some previously used substances that are now banned still affect Lake Vänern, e.g. PCB. This is because they decompose slowly and therefore still remain in the sediments. In some cases, remediation may be justified. Leakage of environmental pollutants from contaminated land also affects Lake Vänern and the watercourses. Here, remediation is more commonly carried out than in limnic environments.

The issue of endocrine disrupting substances, especially pharmaceutical residues, is increasingly discussed. This is an area that requires further investigation.

Reduced encroachment
Relevant clearing methods, such as the clearing of undergrowth and reed cutting, are required to reduce encroachment and instead favour environments and natural values that have disappeared. Recreation is also favoured by clearing, since it opens up the views and gives better access to water and swimming.

DISTRIBUTION

12.2. Second type of habitat/land cover:___Wetlands _____ See ecosystems below

Wetlands are a group of biotope types where shallow water covers the soil, or is present either at or near the surface of the soil. Mires, wet forests, shallow lakes and running waters are included in the definition. Wetlands constitute a valuable natural resource with prerequisites for a rich flora and fauna. Wetlands are

scattered along the shores of Lake Vänern and commonly bear evidence of human impact. The south-western part of the area is home to most wetlands of the highest classification according to the County Administrative Board's wetland inventory. Other valuable areas are scattered along the coast.

National environmental quality objectives
Natural Acidification Only; Zero Eutrophication; Thriving Wetlands; A Rich Diversity of Plant and Animal Life.

Ecosystem: Shallow lakes (regional)
Shallow lakes rich in vegetation are important sites for birdlife. In general, it can be said that the richer the underwater flora, the more resting and breeding birds. Other organisms are also favoured by underwater vegetation as it offers protection against predators and strong wave movements. Shallow lakes form a unique aquatic environment as the productive and the regenerating water layers are in direct contact, providing a direct nutrient supply which contributes to the highly productive characteristics of the lake.

Ecosystem: Small surface waters (regional)
Shallow wetlands in the cultivated landscape are among the most species and specimen rich aquatic environments, and one of the most highly productive environments when it comes to biological diversity. Small surface waters are no more than one hectare big and the water surface is present all year or for varying periods of time during the year.

Ecosystem: Bogs (local)
Mires produce peat and form on waterlogged land, overgrown lakes, or where there is a dependency on shallow surface water. Raised bogs tend to be species-poor since the water supply from surrounding land has been cut off.

Ecosystem: Fens (local)
Fens tends to be more nutrient-rich than bogs and are characterised by more nutrient-demanding and species-rich vegetation, including more nutrient-rich peats. The reason is that fens are fed by direct precipitation and also by water from surrounding land areas. Rich fen environments are fed by land and surface water containing minerals from adjacent mineral-rich bedrock or soil. Vegetation is also affected by the mobility and oxygen levels of the water. Rich fens are located near the plateau mountains and are protected as Natura 2000 sites.

12.2.1. Characteristic species:

Group	***Scientific name***	***Common English name***
Vascular plants	*Alisma plantago-aquatica*	Water Plantain
	Caltha palustris	Marsh-marigold
	Carex cespitosa	No common English name found
	Carex flacca Schreb	Glaucous Sedge
	Dactylorhiza incarnate	Early Marsh-orchid
	Epipactis palustris	Marsh Helleborine
	Glyceria maxima	Reed sweet-grass
	Gymnadenia conopsea	Fragrant Orchid
	Lythrum salicaria	Purple-loosestrife
	Phragmites australis	Common Reed

	Polygonum amphibium *Potamogeton spp.* *Primula farinose* *Ranunculus spp.* *Schoenus ferrugineus* *Scrophulariaceae spp. Sparganium emersum Rehmann Succisa pratensis* *Typha latifolia*	Amphibious Bistort Broad-leaf Pondweeds Bird's-eye Primrose Buttercups Brown Bog-rush Speedwells Unbranched Bur-reed Devil's-bit Scabious Bulrush
Mosses	*Sphagnum spp.*	Peat Moss
Birds	*Anser anser* *Anser fabalis* *Botaurus stellaris* *Circus aeruginosus* *Crex crex* *Charadrius dubius* *Gallinago media* *Lanius collurio* *Limosa lapponica* *Tadorna tadorna*	Greylag Goose Bean Goose Bittern Marsh Harrier Corncrake Little Ringed Plover Great Snipe Red-Backed Shrike Bar-Tailed Godwit Shelduck
Molluscs	*Lymnea stagnalis* *Planorbarius corneus*	Great Pond Snail Great Ramshorn
Arachnids	*Arctosa leopardus* *Drassyllus lutetianus* *Dolmedes fimbriatus* *Pardosa pullata* *Pirata hygrophilus* *Trochosa spinipalis* *Zelotes latreillei*	Wolf Spider No English common name found Raft Spider No English common name found No English common name found No English common name found No English common name found
Insects	*Chironomidae spp.* *Hemiptera spp.* *Nematocera* *Odonata spp.* *Simuliidae*	Non-biting Midges Half-wings Mosquito Dragonflies Black Fly

12.2.2. Important natural processes:

Continuous peat formation

Peat develops from organic matter in bogs and fens when the decomposition the dead biomass is hampered or completely absent due to e.g. lack of oxygen. This, in turn, is due to various kinds of waterlogging. This can occur directly in open watercourses, through encroachment followed by stagnation of the surrounding land, through flooding, or when runoff of local precipitation is disrupted.

Encroachment

Stands of reeds and sedges expand, which leads to encroachment.

Other processes

- The outflow of groundwater - and ground water quality – has a significant impact on the ecological characteristics of wet meadows and fens.
- Grazing by game animals

12.2.3. Main human impacts:

Ditching and drainage
Ditching and drainage is carried out to create arable land. These and other draining measures have an impact on the hydrological and hydrochemical conditions of wetlands, sometimes to the extent that they disappear.

Peat extraction
Peat is extracted for use as fuel.

12.2.4. Relevant management practices:

Refrain from drainage
Refrain from ditching and drainage

Harvesting
Harvesting can be carried out to clear emerging reeds and/or to prevent encroachment.

Grazing
Wetlands need to be grazed in order to maintain their natural values. Grazing should be adapted to prevent encroachment. Too many heavy animals on a small surface could have a negative effect on plants that are sensitive to trampling.

Controlled draining
Controlled draining can be carried out in order to strengthen the effects of wetlands. This measure strengthens the environmental benefit and lifespan of wetlands.

Dredging
Dredging is a measure aimed at increasing the performance of wetlands. The purpose of dredging is to reduce eutrophication and promote biological diversity.

DISTRIBUTION

12.3. Third type of habitat/land cover: Coastal ecosystems — See ecosystems below

The Lake Vänern coast within the proposed biosphere reserve is a mosaic that includes a broad variety of ecosystems. This variation in the coastal landscape contributes to a rich flora including species that are otherwise linked to marine environments, e.g. golden dock *(Rumex maritimus)* and sand sedge *(Carex arenaria).* The varied biotopes also contribute to a rich bird fauna.

National environmental quality objectives
Natural Acidification Only; A Rich Diversity of Plant and Animal Life, Flourishing Lakes and Streams; Zero Eutrophication; Good-Quality Groundwater.

Ecosystem: Seasonally inundated grasslands (regional)
Natural hay meadows that are not artificially fertilised, cultivated or seeded with alien species. These are the oldest types of meadows along lake shores, rivers or streams. Open wet meadows provide a highly

species-rich environment and are home to many rare and threatened plants and animals, especially when the grassland is managed.

Ecosystem: Rocky shores (regional)
Rocky shores dominate the coast of the proposed biosphere reserve. Mineralogical conditions and exposure give rise to an interesting flora and vegetation. Species such as sheep's-fescue *(Festuca ovina)*, red canary-grass *(Phalaris arundinacea)*, purple moor-grass *(Molinia caerulea (L.) Monech)* and alpine rush *(Juncus alpinoarticulatus Chaix)* dominate the rocky shores. Vegetation is mainly localised to cracks where soil and moisture has collected.

Ecosystem: Clay and mud shores (regional)
These are only found in protected bays and are home to the most species-rich flora. Contiguous reed beds are common in nutrient-rich bays with clay and mud shores. Reeds are largely represented by the cosmopolitan common reed *(Phragmites australis)*. Large contiguous reed beds are important for breeding birds such as bittern *(Botaurus stellaris)* and marsh harrier *(Circus aeruginosus)*. They also provide valuable spawning grounds for fish.

Ecosystem: Boulder and shingle shores (local)
This shore type is dominated by large rocks and boulders, with a very scant interspersion of fine-grained soils between and under the rocks. They are normally of small ecological value, but can in places provide breeding sites for rare species of birds. This type of shore completely dominates at Hindens rev, but also occurs in other places in exposed environments.

Ecosystem: Sandy shores/ sand dunes (local)
The impact of waves has created sand dunes of varying sizes along the shores of Lake Vänern. This is a relatively rare environment with a potential for high natural values. Many of the sandy beaches are highly frequented by summer visitors.

12.3.1. Characteristic species:

Group	***Scientific name***	***Common English name***
Vascular plants	*Carex acuta* *Lysimachia vulgaris* *Lythrum salicaria* *Phragmites australis*	Slender Tufted-sedge Yellow Loosestrife Purple Loosestrife Common Reed
Photoplankton	*Aphanizomenonflos-aquae* *Aulacoseira (släkte)* *Crytomonas* *Rhodomonas* *Woronichinia naegeliana*	Cynobacteria Diatoms Cryptomonads Rhodomonads Cynobacteria
Submerged plants	*Chara globularis* *Isoëtes* *I. echinospora* *I. lacustris* *Myriophyllum* *M. alterniflorum* *M. sibiricum* *M. spicatum*	Fragile Stonewort (Charales) Quillworts Spring Quillwort Lake Quillwort Water Milfoil Alternate Water-milfoil Common Water-milfoil Spiked Water-milfoil Whorled

	M. verticillatum	Water-milfoil
	Nitella flexilis	Stonewort
	Nitella opaca	Dark Stonewort
	Potamogeton perfoliatus	Perfoliate Pondweed
Lichens	*Cladina arbuscula*	Reindeer Lichen
	Cladina rangiferina	Grey Reindeer Lichen
	Cladina stellaris	Star-tipped Reindeer Lichen
Crustaceans	*Gammaracanthus lacustris*	No common English name found
	Monoporeia affinis	No common English name found
	Mysis relicta	Opossum Shrimp
	Pallasea quadrispinosa	No common English name found
	Saduria entomon	Aquatic Sowbug
Mammals	*Castor fiber*	Beaver
	Myotis daubentonii	Daubenton's Bat
Birds	*Anser anser*	Greylag Goose
	Falco subbuteo	Hobby
	Gavia arctica	Black-Throated Diver
	Larus canus	Common Gull
	Pandion haliaetus	Osprey
	Sterna hirundo	Common Tern
Fishes	*Coregonus albula*	Vendaceöja
	Osmerus eperlanus L.	Smelt
	Salmo salar	Gullspång Salmon
	Salmo salar	Klarälv Salmon
	Salmo trutta lacustris	Brown Trout
Molluscs	*Bathyomphalus contortus*	Twisted Ram's-horn
	Pisidium (genus)	Pea Mussel
Insects	*Ephemera danica*	Green Drake
	Ephemera vulgata	Brown Mayfly
	Ephemerella ignita	No common English name found
	Leptophlebiidae vespertina	No common English name found
	Myrmeleon bore	Antlion

12.3.2. Important natural processes:

Dune formation and vegetation succession
Water level variations and wind contribute to sand dune formation. When the sand encounters an obstacle, it begins to form into sand dunes of varying sizes. Sand dunes undergo various stages of plant succession, starting with grass, mosses and lichens on young dunes and ending in forestation. A good example is Östra Sannorna where a number of dunes lie parallel to the shoreline.

Erosion and accumulation
Erosion can be a problem in some areas, especially on exposed sandy shores. Powerful wave actions transport material from the shore into the lake and the shoreline moves towards land. In other areas, accumulation occurs, whereby waves deposit sand and sediments onto land.

Water level variations
Lake Vänern has been regulated since 1938, and the water levels vary less than prior to regulation. It is mainly shallow shores that are affected by this lack of variation.
The combination of land elevation, reduced natural water level variations, and reduced grazing and

haymaking leads to encroachment.

Ice movements
Ice movements mainly affect vegetation around shores and islets. During cold winters, the ice can scrape off vegetation along the shores. The bark on trees may also be stripped when water levels are high.

Encroachment
See ”Lakes and watercourses” above (chapter. 12.1.2).

12.3.3. Main human impacts:

Built-up areas and recreation
It is attractive to build houses along the shores of Lake Vänern. A large proportion of the shores are now exploited by permanent houses and summer cottages. Harbours and fishing villages exist in a few places. The coast is also attractive for recreation. The archipelago is well-frequented by boats in the summer. Access to the lake from land is, however, limited.

Harbour walls and infilling
Harbour walls and infilling alter the currents in the lake. Such developments also alter the shoreline.

Water regulation 1938
The regulation of Lake Vänern has resulted in extreme water level fluctuations occurring more seldom.

Boat traffic
Risk of importing alien species.

12.3.4.Relevant management practices:

Minimal exploitation
Protect natural values linked to coastal ecosystems according to the aims of shore protection legislation by limiting building.

Minimisation of erosion damage caused by recreational activities or forestry
Outdoor recreational activities should be directed to areas less sensitive to wear and tear.
Increased consideration when forestry is carried out in sensitive areas.

Reduced encroachment
See ”Lakes and watercourses ” above (chapter 12.1.4).

DISTRIBUTION

12.4. Fourth type of habitat/land cover: ___Forests_____See ecosystems below

Based mainly on climatic and biotic, but also historic, factors, the country has been divided into five major forest ecosystems with their own characteristic features. Coniferous forests in the proposed biosphere reserve are located in the southern coniferous region. Its south-westerly border coincides with

the southern limit of the natural range of spruce, i.e. the line that spruce reached in its natural spread from the north before extensive forestation took place in southern Sweden.

Deciduous forests constitute the most species-rich environments in the country, and a large number of the red-listed species of insects, mosses, lichens and fungi are linked to different deciduous forest environments.

National environmental quality objectives
Sustainable Forests; Flourishing Lakes and Streams; Thriving Wetlands; A Rich Diversity of Plant and Animal Life; Zero Eutrophication; Natural Acidification Only.

Coniferous forest (regional)

Ecosystem: Flat-rock pine forest (regional)
This is a Nordic vegetation type that grows on areas of Archaean rock. It is often very dry, with a thin layer of soil, and nutrient-poor. This form of habitat occurs in areas that existed below the High Coast line (the highest level reached by the sea in any of its inland lake stages after the last Ice Age) and that were washed clear by the waves during the land uplift.

Flat-rock pine forests are often species-poor. The vegetation includes low, sparse pine forest *(Pinus sylvestris)*, heather *(Calluna vulgaris)*, cowberry *(Vaccinium vitis-ideas)*, reindeer lichen *(Cladonia rangiferina)*, fungi and swallow-wort (*Vincetoxicum hirundinaria*). Animals include ants, centipedes *(Chilopoda)* and beetles *(Coleoptera)*. Birds include capercaillie (*Tetrao urogallus*), woodpeckers, *Picidae)*, crossbills *(Loxia)*, mistle thrush (*Turdus viscivorus*), nightjar *(Caprimulgus europaeus)*, redstart (*Phoenicurus phoenicurus*) and tits.

Within the proposed biosphere reserve, this nature type is largely found along the coastal cliffs of Lake Vänern and is well-developed on the islands in the Kållandsö archipelago. Many of the islands are home to very old, pine-dominated forest, rich in old pines and dead wood. Very old pines and pine stands that are up to 200 years old are found in scattered areas, mainly on the islands of Djurö, Västra Brommö and Kalvöarna.

Ecosystem: Bilberry spruce forest (regional)
Bilberry spruce forest is more humid and nutrient-rich than flat-rock pine forest, with a rich flora and fauna. Plants include spruce (*Picea abeis)*, bilberry *(Vaccinium myrtillus)*, ferns *(Polypodiaceae)*, mosses and fungi. Animals include ants, spiders *(Arachnae)*, earth-boring dung beetle (*Geotrupes stercorarius)* and ground beetles *(Carabidae)*.

Ecosystem: Calcareous coniferous forest (local)
Calcareous coniferous forests are characterised by naturally regenerated forest with long-term continuity. They are rare in the forest landscape. Many of the calcareous coniferous forests are home to a species-rich flora, including mycorrhizal fungi. A great number of red-listed species are linked to these forests. There are several calcareous coniferous forests on Mount Kinnekulle.

Ecosystem: Coniferous swamp forest (local)
In this type of forest any one species rarely dominates the stand. Apart from on pine bogs, spruce and pine most often grow together.

Deciduous forest (regional)

Ecosystem: Broadleaf forest (regional)
The broadleaf species elm *(Ulmus glabra)*, ash *(Fraxinus excelsior)*, oak *(Quercus)*, Norway maple *(Acer platanoides)*, rowan *(Sorbus aucuparia)* and beech *(Fagus sylvatica)* occur as pure stands and in stands mixed with either conifers and/or other deciduous trees, and as solitary trees or copses in the cultural landscape. In addition, broadleaf trees are a major feature of parks and avenues. Broadleaf forests are often mixed. To a fairly large extent, structures and stands remain from the old cultivated landscape, where broadleaf trees were an important feature. The remains of the tree and shrub layers, e.g. old oaks and pollarded trees, can be found especially on the sites of former infields.

On Mount Kinnekulle, forest values include very rich ash-elm groves, oak-hazel groves and oak pastures, with a large number of old, coarse trees. The transition between forest and wooded pastures is often diffuse. Valuable oak environments and oak pastures are found in the area of Ullersund, in the Eken archipelago and on the eastern part of Kållandsö.

Ecosystem: Other broadleaf forests (regional)
Among other broadleaf forests are a number of deciduous forest environments with varying mixes of species. Some of them are described below:

Ecosystem: Waterside natural deciduous forests (local)
These include shoreline alder forests and various types of secondary deciduous forests. The shoreline forests most deserving of protection are those that are flooded during short or long periods. A zonation of various flood-tolerant stands is often found along the water's edge. Alder *(Alnus glutinosa)*, birch *(Betula)* and aspen *(Populus tremula)* are favoured and can form flood forests with high natural values. Some of these forests stand on former haymaking and grazing land that has successively become overgrown. Many waterside forests along flat shores are a result of the 19th century lake drainages, and are now the first generation of forest on former lakebeds. Shoreline alder forests are found in large areas by Lake Vänern.

Ecosystem: Natural succession (regional)
Natural species succession is a relatively short-lived event in the forest landscape and "moves around" over a long period in mesic soil areas. Late successions are characterised by many standing and fallen dead trees with a sparse interspersion of old deciduous trees successively screened by invading spruce. This forest type has been strongly under-represented for the past hundred years compared with its historic distribution. White-backed woodpecker *(Dendrocopos leucotos)* demands extensive habitats of deciduous woodland including old deciduous trees and an abundance of dead and decaying wood, mainly aspen *(Populus tremula)*, birch *(Betula)*, goat willow *(Salix caprea)* and alder *(Alnus glutinosa)*. An action programme has been established for the conservation of the white-backed woodpecker. It is estimated that this programme will also significantly favour around 200 other red-listed species – mainly different kinds of lichens, mosses, fungi, beetles and birds.

Ecosystem: Wet forest (local)
Wet forests grow on damp or wet soil. They are sometimes called Sweden's rainforests. Wet forests are relatively dense with a large proportion of dead wood, and are home to many valuable species and habitats. They are of great significance for several species of bird, including capercaillie (*Tetrao urogallus*), hazel grouse *(Bonasa bonasia)*, rustic bunting *(Emberzia rustica)*, long-tailed tit *(Aegithalos caudatses)*, and a number of woodpecker species. The proposed biosphere reserve includes several types

of wet forest. The most common are shoreline alder forests and alder carrs. Wet forests are found at Östra Sannorna and on the island of Torsö.

12.4.1. Characteristic species:

Group	*Scientific name*	Common English name
Vascular plants	*Allium ursinum*	Ramsons
	Anemone nemorosa	Wood Anemome
	Carex canescens	White Sedge
	Carex elongata	Elongated Sedge
	Carex globularis	No Common English name found
	Caltha palustris	Marsh-marigold
	Convallaria majalis	Lily-of-the-valley
	Deschampsia flexuosa	Waivy Hair-grass
	Dryopteris filix-mas	Male-fern
	Equisetum sylvaticum	Wood Horsetail
	Filipendula ulmaria	Meadowsweet
	Gymnocarpium dryopteris	Oak Fern
	Hepatica nobilis	Liverleaf
	Linnaea borealis	Twinflower
	Lysimachia thyrsiflora	Tufted Loosestrife
	Maianthemum bifolium	May Lily
	Matteuccia struthiopteris	Ostrich Fern
	Melampyrum ssp.	Common Cow-wheat
	Menyanthes trifoliata	Bogbean
	Mercurialis perennis	Dog's Mercury
	Oxalis acetosella	Wood-sorrel
	Paris quadrifolia	Herb-Paris
	Potentilla palustris	Marsh Cinquefoil
	Pteridium aquilinum	Bracken
	Pulmonaria obscura	Suffolk Lungwort
	Ranunculus ficaria	Lesser Celandine
	Trientalis europaea	Chickweed Wintergreen
	Vacciniium myrtillus	Bilberry
	Vaccinium vitis-idaea	Cowberry
	Viola palustris	Marsh Violet
Mosses	*Anomodon viticulosus*	Anomodon Moss
	Antrichia curtipendula	Pendulous Wing-moss
	Brachythecium rivulare	River Feather-moss
	Calliergonella cuspidata	Pointed Spear-moss
	Dicranum majus	Dicranum Moss
	Dicranum scoparium	Broom Moss
	Homalothecium sericeum	Silky Wall Feather-moss
	Hypnum cupressiforme	Cypress-leaved plait-moss Squirrel-tail
	Leucodon sciuroides	Moss
	Mnium ssp.	No common English name found
	Neckera complanata	Flat Neckera-moss
	Pleurozium schreberi	Schreber's Feathermoss
	Pohlia nutans	Pholia Moss
	Polytrichum commune	Common Haircap Moss
	Pseudobryum cinclidoides	Pseudobryum Moss
	Ptilium crista-castrensis	Ostrich-plume Feather-moss
	Rhodobryum roseum	Rose Moss

	Sphagnum ssp.	Peat Moss
	Spagnum girgensohnii	Bog moss
	Sphagnum squarrosum	Spread-leaved Bog Moss
Fungi	*Albatrellus ovinus*	Sheep Polypore
	Amanita friabilis	Fragile Amanita
	Amanita muscaria	Fly Agaric
	Amanita phalloides	Deathcap
	Amanita porphyria	Grey Veiled Amanita
	Amanita rubescens	Blusher
	Armillaria mellea	Honey Fungus
	Boletus calopus	Bitter Beech Bolete
	Cantharellus tubaeformis	Trumpet Chanterelle
	Cortinarius armillatus	Red Banded Webcap
	Cortinarius salor	No common English name found
	Cortinarius traganus	Grassy Webcap
	Fomes fomentarius	Tinder Bracket
	Fomitopsis pinicola	Red Banded Polypore
	Ganoderma applanatum	Artist's Bracket
	Geastrum triplex	Collared Earthstar
	Gloeophyllum sepiarium	Conifer Mazegill
	Gomphidius glutinosus	Slimy Spike
	Gyrodon lividus	Alder Bolete
	Hymenochaete tabacina	Reddish-brown Crust
	Hypholoma fasciculare	Sulphur Tuft
	Inocybe lacera	Torn Fibrecap
	Kuehneromyces mutabilis	Sheathed Woodtuft
	Leccinum aurantiacum	Red Aspen Bolete
	Leccinum scabrum	Brown Birch Bolete
	Micromphale perforans	Stinking Parachte
	Paxillus involutus	Briwn Rollrim
	Phellinus tremulae	Aspen Bracket
	Piptoporus betulinus	Birch Polypore
	Rozites caperata	The Gypsy
	Russula pumila	No common English name found
	Stereum hirsutum	Hairy Curtain Crust
	Suillus bovinus	Bovine Bolete
	Suillus luteus	Slippery Jack
	Thelephora terrestris	Earthfan
	Trichaptum abietinum	Purplepore Bracket
	Tricholoma album	White Knight
Lichens	*Alectoria sarmentosa*	Witch's Hair
	Arthonia leucopellaea	Dot Lichen
	Arthonia spadicea	Dot Lichen
	Bryoria capillaris	Grey Horsehair Lichen
	Cladina arbuscula	Reindeer Lichen
	Cladina rangiferina	Grey Reindeer Lichen
	Cladina stellaris	Star-tipped Reindeer Lichen
	Evernia prunastri	Oakmoss Lichen
	Hypogymnia physodes	Monk's-hood Lichen
	Hypogymnia tubulosa	Powder-headed Tube Lichen
	Parmelia saxatilis	Salted Shied Lichen
	Peltigera canina	Felt Lichen
	Pertusaria amara	Bitter Wart Lichen
	Platismatia glauca	Varied Rag Lichen
	Pseudevernia furfuracea	Tree Moss

	Ramalina fraxinea	Cartilage Lichen
	Ramalina thrausta	Angel's Hair
	Usnea filipendula	Fishbone Beard Lichen
	Usnea hirta	Bristly Beard Lichen
	Xanthoria parietina	Orange Wall Lichen
Mammals	*Alces alces*	Moose
	Apodemus flavicollis	Yellow-necked Mouse
	Capreolus capreolus	Roe Deer
	Castor fiber	Beaver
	Cervus dama	Fallow Deer
	Lepus europaeus	Brown Hare
	Lepus timidus	Mountain Hare
	Pipistrellus ssp.	Bats
	Sciurus vulgaris	Squirrel
	Vulpes vulpes	Fox
Birds	*Accipiter nisus*	Sparrowhawk
	Aegithalos caudatos	Long-tailed Tit
	Anthus trivialis	Tree Pipit
	Buteo buteo	Buzzard
	Carduelis spinus	Siskin
	Coccothraustes coccothraustes	Hawfinch
	Dendrocopos major	Great Spotted Woodpecker
	Dendrocopus minor	Lesser Spotted Woodpecker
	Dryocopus martius	Black Woodpecker
	Erithacus rubecula	Robin
	Fringilla coelebs	Chaffinch
	Garrulus glandarius	Jay
	Glaucidium passerinum	Pygmy Owl
	Loxia curvirostra	Crossbill
	Parus arter	Coal Tit
	Parus caeruleus	Blue Tit
	Parus major	Great Tit
	Parus montanus	Willow Tit
	Parus palustris	Marsh Tit
	Phylloscopus sibilatrix	Wood Warbler
	Phylloscopus trochilus	Willow Warbler
	Picus viridis	Green Woodpecker
	Pyrrhula pyrrhula	Bullfinch
	Regulus regulus	Goldcrest
	Scolopax rusticola	Woodcock
	Sitta europaea	Nuthatch
	Sylvia atricapilla	Blackcap
	Tetrao urogallus	Capercaillie
	Tringa ochropus	Green Sandpiper
	Troglodytes troglodytes	Wren
	Turdus merula	Blackbird
	Turdus philomelos	Song Thrush
Reptiles and amphibians	*Anguis fragilis*	Slow Worm
	Lacerta vivipara	Viviparous Lizard
	Natrix natrix	Grass Snake
	Rana temporaria	Common Frog
	Vipera berus	Adder/Viper
Molluscs	*Acanthinula aculeata*	Spiny Snail
	Clausiliidae spp.	Door Snails
	Cochlicopa lubrica	Slippery Moss Smnil

	Euconulus fulvus	Tawny Glass Snail
	Vertigo ronnebyensis	No common English name found
Insects	*Agonum fuliginosum*	No common English name found
	Ampedus sanguinolentus	Click Beetle
	Hippoboscidae spp.	Louse flies
	Loricera pilicornis	No common English name found
	Notiophilus reitteri	Ground Beetles
	Operophtera brumata	Winter Moth
	Oxytelus fulvipes	No common English name found
	Trechus rivularis	No common English name found

12.4.2. Important natural processes:

Internal forest dynamics
Changes to the forest structure and species composition have not only been caused by felling. Historically, grazing has also had a major impact. The decline of small-leaved lime *(Tilia cordata)*, for example, is believed to be caused by the pressure of grazing, as it is greatly favoured by domestic animals. Ash *(Fraxinus excelsior)*, hornbeam *(Carpinus betulus)*, hazel *(Corylus avellana)*, elm *(Ulmus glabra)*, Norway maple *(Acer platanoides)*, goat willow *(Salix caprea)*, aspen *(Populus tremula)* and rowan *(Sorbus glabra)* also belong to this category, whereas other forest trees are favoured by grazing.

Oaks *(Quercus)* have their own history. Gustav Vasa prohibited the felling of oaks in 1558. During 300 years, a large population of old oaks accumulated. Many of them stood in the open agricultural landscape. In 1830, farmers were allowed to redeem the trees, and in 1875 they generally returned into the ownership of the landowners. This resulted in most oaks being felled. The ones left were generally standing on land belonging to the church or the nobility. This is evident in the manor environments around Mount Kinnekulle. Previous land use has often had drastic and lasting effects on species occurrence in the landscape.

Climate variations
The forest flora and fauna in the proposed biosphere reserve are adapted to the local climate and seasonal variations. Shoreline forests and flat-rock forests are adapted to extreme drought.

Ecological disturbances
Ecological disturbances, such as storms, flooding, fire, etc., are rapid changes that are normal for the ecosystem. *Wind* storms causing total damage to forests over many hundreds of hectares recur at intervals that are longer than the maximum lifespan of most trees. Old trees resist wind better than younger ones. Wind disturbance thus differs from forestry, which has a tendency to cut down old trees.

Disturbance due to *flooding* has almost disappeared through human intervention by way of various water regulations, but is likely to occur more often in the future due to climate change. We can only speculate about the appearance of old flood forests. It is known, however, that *Salix* species, alder *(Alnus glutinosa)*, ash *(Fraxinus excelsior)*, white birch *(Betula pubescens)*, aspen *(Populus tremula)* and oak *(Quercus)* are more flood-resistant than other trees. Very early on, naturally flooded and fertilised forests transformed into hay meadows; in the province of Götaland most likely in pre-historic times.

Water level variations
Water level variations create different types of forest. Some areas that are prone to flooding are home to

e.g. alder carrs. Forest near the waterline is affected by ice movements. Bark abrasion damages trees.

Effects of grazing
Wild animals continuously graze in the area. Moose *(Alces alces)*, row deer *(Capreolus capreolus)* and fallow deer *(Cervus dama)* occur, with a minimal effect on species composition and stand development.

Other processes
- Peat formation
- Pests
- Fire
- Wood decay

12.4.3. Main human impacts:

Agrarian pursuits
The biggest impact on the boreal forests before the 19th century was linked to various agrarian pursuits. The main activities were summer forest grazing by domestic animals and the gathering of winter forage for them. Forest fires were initiated to improve grazing, and it is likely that some forest areas burned more frequently than they would have done under natural conditions. This probably affected long-term regeneration, and the proportion of pine *(Pinus sylverstris)* increased compared with Norway spruce *(Picea abies)*, since pine is more fire-tolerant than spruce.

Forestry
Before industrialisation, little value was given to the large forest resources in Sweden. To some extent, coniferous forests provided timber for house building, tar production and fuel, but was largely regarded as an impassable obstacle rather than a resource. The Crown encouraged farmers to apply slash-and-burn agriculture to gain more arable land at the expense of the dark coniferous forest. Deciduous trees growing near farms were often pollarded and the leaves gathered for winter fodder. Farmers had the common right to use the surrounding forest, but as a rule the forest was not parcelled between the farms until the great consolidation *(Storskifte)* in the second half of the 18th century. Deciduous trees on the other hand, and in particular the protected oaks, were used for shipbuilding and attracted the interest and care from those in power.

Forest land within the proposed biosphere reserve predominantly consists of planted forests with trees of the same age, and in many areas monocultures with no interspersion of old, coarse trees. The highest parts of the Mount Kinnekulle plateau are dominated by stands of Norway spruce *(Picea abies)* planted on previously open fields and pastures. A lot of this forest was planted in the 1960s. Today's forestry tends to allow more deciduous trees to remain in coniferous forests.

Reforestation, forest roads and clearings have contributed to the fragmentation of the once untouched landscape.

The 20th century has also seen a sharp decline in the prevalence of dead wood (standing and fallen) and old, coarse trees.

Drainage, ditch clearance and vehicle damage also affect the ecological balance in the forests.

Other impacts
Introduction of alien species, hunting, the cessation of forest grazing, pollution from air, and ash emissions.

12.4.4. Relevant management practices:

Conservation-friendly forestry
Large areas of forest within the proposed biosphere reserve are certified according to the Forest Stewardship Council Sweden (FSC Sweden) standards or similar. This means that environment and conservation-friendly forestry will be practised at least to the requirements imposed by FSC. Certification requires the setting up of a "Green Forest Mangament Plan".

Forestry measures must follow the national environmental quality objective which states that "the value of forests and forest land for biological production must be protected, at the same time as biological diversity and cultural heritage and recreational assets are safeguarded".

Within the proposed biosphere reserve it would be an advantage if Green Forest Management Plans were drawn up with a landscape perspective through cooperation between several landowners. This would increase the opportunities for finding overall solutions where formal protection and voluntary set-asides supplement each other.

Effect of grazing
The regulation of this natural process occurs in core areas by way of fencing in seedlings and saplings of e.g. oak.

Deciduous forestry
Knowledge about how to manage broadleaf forests is scant, and at the same time there is increasing interest in planting new forests with beech *(Fagus sylvatica)*, oak *(Quercus)*, small-leaved lime *(Tilia cordata)*, ash *(Fraxinus excelcior)*, elm *(Ulmus glabra)*, hornbeam *(Carpinus betulus)*, Norway maple (*Acer platanoides*) and wild cherry *(Prunus avium)*.

The area of broadleaf forest was significantly larger in pre-historic times compared to today. Broadleaf forests are home to many threatened species and are in need of increased protection. Interest is growing among forest owners in southern Sweden for planting new broadleaf forest, which would favour both nature conservation and the timber processing industry. More knowledge is needed about efficient cultivation of broadleaf forests, restoration requirements, and effective general conservation measures. Furthermore, there is a need for increased knowledge about the value of broadleaf forest from a national economy perspective. At the same time, the demand for timber from selected valuable broadleaf trees must increase in order to stimulate forest owners to a more active management.

DISTRIBUTION

12.5. Fifth type of habitat/land cover: Arable land See ecosystems below

The arable land within the proposed biosphere reserve is varied and diverse, created in symbiosis between humans and animals over thousands of years. Today, it can be hard to distinguish traces of ancient cultivation in the landscape. The post-war agricultural transformation has had an impact on the landscape, with larger holdings, extensive replanting with Norway spruce *(Picea abies)*, the removal of obstructions to mechanical cultivation, etc. The cultivated landscape has become more monotonous.

National environmental quality objectives
A Varied Agricultural Landscape; A Rich Diversity of Plant and Animal Life; A Good Built Environment, A Non-Toxic Environment; Zero Eutrophication; Flourishing Lakes and Streams; Thriving Wetlands.

Ecosystem: Fields and seeded grassland (regional)
The landscape on Kålland is characterised by a fully cultivated landscape, broken by unproductive areas and stretches of woodland. The terrain is fragmented. Production is mainly arable with some animal husbandry.

Mount Kinnekulle is surrounded by largely continuous farmland, which becomes fragmented near the forest edge. The cultivated landscape around Mount Lugnåsberget is more mosaic-like. The Swedish Environmental Protection Agency has awarded parts of Kållandsö and practically all of Mount Kinnekulle the status of ”Sweden’s finest agricultural landscape”.

Ecosystem: Grazing pasture (regional)
Kålland’s mosaic landscape includes grazing land with rocky outcrops and oak pastures.

Characteristic for Mount Kinnekulle are the extensive pastures on the limestone plateau. In many places the soil consists only of a thin layer of weathering gravel with scattered limestone outcrops. This particular type of environment is called *alvar* – a very rare biotope found only in a few places around the world, also called limestone pavement.

Mount Kinnekulle is also famous for its unusually large number of large, old deciduous trees. The oak enjoys a special position. The many oak-filled pastures on the western side of Mount Kinnekulle make the mountain one of the most valuable oak tree areas in the whole of Europe. On Kålland there are species-rich dry meadows linked to the unproductive areas of farmland.

Ecosystem: Meadows (local)
Meadows reached their maximum distribution during the 17th and 18th centuries. This was the culmination of a development spanning over more than 2000 years. Meadows were the most important feature of infields. In the early 19th century, there were around two million hectares of meadows in Sweden. Today, only some 2,500 hectares remain, which means that 99% of all meadows have disappeared. Remnants of wooded meadows are found on Mount Kinnekulle.

Ecosystem: Ancient remains (regional)
Of particular interest from an agrarian history point of view are ancient remains and archaeological environments directly linked to the agrarian economy, such as settlements and remnants of primitive iron production and subsidiary industries. Rune stones and certain grave types, e.g. barrows and stone cists, are also of interest.

Abandoned agricultural remains, so called fossil fields or ancient fields, constitute a fundamental historic component of the cultivated landscape. We now know that many of the remains date back to pre-historic times and the Middle Ages.

Rich Bronze Age environments, including the bronze shields discovered in Fröslunda, are found on Kålland, as well as barrows and rock carvings. The area is also rich in Iron Age remains, e.g. large stone circles, and numerous grave-fields and rune stones. The 18th century agricultural landscape can still be traced at Källstorp manor farm, through the buildings, the fence that divided the crop-rotation fields and

parts of the cattle-path that led to the outfields. There are also remains of an Iron Age village and a Bronze Age barrow.

Mount Kinnekulle is also an important Bronze Age settlement area with a large rock carving site at Flyhov in Husaby. A zone around the mountain is rich in grave-fields from the Iron Age. Västerplana meadow is an interesting site, where clearance cairns clearly show that the area was part of a system of cultivation and fallow during the Bronze Age and later cultivated as a meadow when Västerplana village was formed.

12.5.1 Characteristic species:

Group	***Scientific name***	***Common English name***
Vascular plants	*Agrostis canina*	Velvet Bent
	Agrostis capillaris	Common Bent
	Ajuga pyramidalis	Pyramidal Bugle
	Alopecurus pratensis	Meadow Foxtail
	Antennaria dioica	Mountain Everlasting
	Arnica montana	Mountain Arnica
	Bistorta vivipara	Alpine Bistort
	Botrychium spp	Moonworts
	Briza media	Quaking-grass
	Caltha palustris	Marsh-marigold
	Cardamine pratensis	Cuckooflower
	Carex spp	Sedges
	Carlina vulgaris	Carline Thistle
	Centaurea cyanus	Cornflower
	Cirsium helenioides	Melancholy Thistle
	Consolida regalis	Forking Larkspur
	Corynephorus canescens	Grey Hair Grass
	Crepis praemorsa	Leafless Hawk's-beard
	Cynosurus cristatus	Crested Dog's-tail
	Dactylorhiza incarnata	Early Marsh-orchid
	Danthonia decumbens	Heath-grass
	Deschampsia cespitosa	Tufted Hair-grass
	Dianthus deltoides	Maiden Pink
	Euphrasia stricta spp	Eyebrights
	Festuca ovina	Sheep's-Fescue
	Filipendula vulgaris	Dropwort
	Galium verum	Lady's Bedstraw
	Gentiana pneumonanthe	Marsh Gentian
	Gymnadenia conopsea	Fragrant Orchid
	Helictotrichon pratense	Meadow Oat-grass
	Hippocrepis maculata	Spotted Cat's-ear
	Leucanthemum vulgare	Oxeye Daisy
	Linum catharcticum	Fairy Flax
	Luzula multiflora	Heath Wood-rush
	Lychnis flos-cuculi	Ragged-Robin
	Nardus stricta	Matt-grass
	Ophioglossum vulgatum	Adder's-tongue
	Orchidaceae spp.	Orchids
	Pedicularis sylvatica	Lousewort
	Pimpinella saxifraga	Brunet-saxifrage
	Pinguicula vulgaris	Common Butterwort

	Plantago media	Hoary Plantain
	Platanthera bifolia	Lesser Butterfly-orchid
	Polygala spp	Milkworts
	Primula farinosa	Bird's-eye Primrose
	Primula veris	Cowslip
	Pulsatilla vulgaris	Pasqueflower
	Rhinanhtus spp	Rattles
	Scorzonera humilis	Viper's-grass
	Succisa pratensis	Devil's-bit Scabious
	Thymus serpyllum	Breckland Thyme
	Trollius europaeus	Globeflower
	Veronica officinalis	Heath Speedwell
	Veronica spicata	Spiked Speedwell
Mosses	*Leucodon sciuroides*	Squirrel-tail Moss
Fungi	*Agaricus campestris*	Field Mushroom
	Geastrum schmidelii	Dwarf Earthstar
	Geoglossum atropurpureum	Dark-purple Earthtongue
	Hygrocybe spp	Waxcaps
	Lycoperdon lividum	Grassland Puffball
	Tulostoma brumale	Winter Stalkball
Lichens	*Cladina* spp and *Cladonia* spp	Reindeer and Cup Lichens
	Parmelia saxatilis	Shield Lichen
	Ramalina fraxinea	Cartilage Lichen
Mammals	*Alces alces*	Moose
	Capreolus capreolus	Roe Deer
	Dama dama	Fallow Deer
	Eptesicus nilssoni	Northern Bat
	Erinaceus europaeus	European Hedgehog
	Lepus europaeus	Brown Hare
	Meles meles	Badger
	Microtus agrestis	Field Vole
	Murinae spp.	Mice
	Myotis daubentonii	Daubenton's Bat
	Nyctalus noctula	Common Noctule
	Talpa europaea	Common Mole
	Vulpes vulpes	Fox
Birds	*Alauda arvensis*	Skylark
	Anas platyrhynchos	Mallard
	Anthus pratensis	Meadow Pipit
	Buteo buteo	Buzzard
	Carduelis cannabina	Linnet
	Columbia palumbus	Woodpigeon
	Delichon urbicum	House Martin
	Emberiza citrinella	Yellowhammer
	Gallinago gallinago	Snipe
	Hirundo rustica	Swallow
	Lanius collurio	Red-backed Shrike
	Limosa Limosa	Black-tailed Godwit
	Motacilla alba	White Wagtail
	Motacilla flava	Yellow Wagtail
	Numenius arquata	Curlew
	Oenanthe oenanthe	Wheatear
	Phasianus colchicus	Pheasant
	Sturnus vulgaris	Starling
	Tringa totanus	Redshank

	Vanellus vanellus	Lapwing
Reptiles and amphibians	*Anguis fragilis*	Slow Worm
	Bufo bufo	Common Toad
	Natrix natrix	Grass Snake
	Rana arvalis	Moor Frog
	Rana temporaria	Common Frog
	Triturus cristatus	Great Crested Newt
	Triturus vulgaris	Smooth Newt
	Vipera berus	Adder/Viper
	Zootoca vivipara	Viviparous Lizard
Molluscs	*Anodonta anatina*	Duck Mussel
	Anodonta cygnea	Swan Mussel
	Arion lusitanicus	Spanish Slug
	Buccinum undatum	Common Whelk
	Cepaea hortensis	White-lipped Snail
	Helix pomatia	Roman Snail
	Planorbis planorbis	Great Ramshorn
	Pseudanodonta complanata	Depressed River Mussel
Insects	*Ammophila sabulosa*	Sand Wasp
	Aphodiinae spp.	Dung Beetles
	Apis mellifera	Honey Bee
	Bombus hortorum	Small Garden Bumblebee
	Bombus lapidarius	Red-nigger Bumblebee
	Chorthippus brunneus	Common Field Grasshopper
	Cincindela campestris	Green Tiger Beetle
	Coccinellidae spp.	Ladybirds
	Dectius verrucivorus	Wart-Biter
	Gasteruption jaculator	Parasitic Wasp
	Gonepteryx rhamni	Brimstone
	Hemiptera spp.	Half-Wings
	Hyalopterus pruni	Mealy Plum Aphid
	Hymenoptera spp.	Hymenopterons
	Lasius fuliginosus	Shining Black Wood Ant
	Libellula depressa	Broad-bodied Chaser
	Macrosiphum rosae	Rose Aphid
	Maculinea alcon	Alcon Large Blue
	Mecostethus grossus	Large Marsh Grasshopper
	Meligethes aenus	Pollen Beetle
	Mellinus arvensis	Digger Wasp
	Nitidulidae spp.	Sap Beetles
	Omocestus haemorrhoidalis	No common English name found
	Psithyrus bohemicus	Gipsy Cuckoo Bee
	Rhopalocera spp.	Butterflies
	Scathophaga stercoraria	Common Yellow Dung Fly
	Sitobion avenae	Grain Aphid
	Syrphidae spp.	Hover-flies
	Volucella bombylans	No common English name found
	Zygoptera spp.	Damselflies
Arachnids	*Drasyllus lutetianus*	No common English name found
	Ixodida spp.	Ticks
	Pirata piscatorius	Wolf Spiders
	Thanatus striatus	No common English name found

12.5.2 Important natural processer:

Encroachment
When grazing or haymaking ceases, the open landscape becomes overgrown; first by brushwood and eventually by forest. As a result, light-demanding plants become suppressed by shade and disappear. Invasive species take over.

Encroachment happens faster on wet ground than on dry. When management ceases, the number of species may increase during a transitional period. The old meadow and pasture flora remains for a period, while new species invade – mainly plants that thrive on open grassland but are intolerant to haymaking or grazing. After a while, the meadow and grazing flora disappears resulting in diminished diversity. Encroachment also affects the fauna, in particular sand-living insects, which in turn affects amphibians, bats and birds.

Climate variations
(Temperature, drought, precipitation,)
The climate of the local biotope, which may only cover a few square metres or even smaller areas (microclimate), is crucial for the individual plant. For example, tree-living lichens and insects are affected when the microclimate of the host tree changes.

Other processes
Grazing by wild animals is wide-spread, not least on Mount Kinnekulle, which is home to enormous herds of fallow deer *(Cervus dama).* Even so, they are not capable of keeping the landscape open. Present day grazing by wild animals can keep certain dry, nutrient-poor biotopes open for a period, but not in the long term.

Edaphic factors are chemical, physical and biological properties of soils that contribute to the characteristics of ecosystems.

The edaphic factors within the proposed biosphere reserve display great variations. For example, natural grasslands with very high and very low lime content occur, with greatly differing botanic content. Lime content variation is also an important factor when comparing the results of e.g. grassland restoration, as calcareous grassland has a greater potential for rapidly developing a rich grassland community.

There is also a natural gradient of nutrients and hydrological conditions within the proposed biosphere reserve, from seasonally inundated grasslands that receive an annual nutrient supply from Lake Vänern, to arid, nutrient-poor unproductive areas in the cultivated landscape.

Historically, fire has been a major process in clearing new arable, meadow and grazing land. The importance of fire for biodiversity in the cultivated landscape is not fully investigated, with the exception of heaths, but it is likely that fire has played a major role, for example, in the establishing phase of various plants.

The intimate collaboration between the above-mentioned factors is a prerequisite for the subsistence of plants.

12.5.3 Main human impacts

Mowing, haymaking and grazing

A large number of low-growing plants with low competitiveness in untouched conditions gain ground through haymaking and grazing. It allows uncompetitive species to flourish and offers them a good chance of survival.

Rationalisation of farming
Due to agricultural rationalisation in order to increase production, the natural conditions have been affected by man. The use of artificial fertilisers and pesticides, and ditching, are some results of rationalisation.

Agricultural intensification
The use of artificial fertilisers, nitrogen in particular, drastically reduces the number of species in natural grassland. The land is constantly exposed to atmospheric pollution. In addition to acid, precipitation contains levels of nitrogen compounds that make fertilising a direct threat to the existence of a great number of species.

The cleaning of seed and the use of pesticides has led to a strong decimation in the number of arable weeds and beneficial insects.

Cessation of mowing and grazing
Changes in farming include a decline in mowing and grazing, and areas of natural grassland have become fewer and smaller since the 19th century. Natural grassland contains an enormous diversity of species as a result of traditional farming methods. With the cessation of mowing and grazing, these species are displaced by more competitive species, resulting in a decline in biodiversity.

Air pollution
Ground-level ozone has a negative impact on vegetation.

Other impacts
The introduction of alien species, development for housing or infrastructure, cessation of farming, hunting.

12.5.4 Relevant management practices:

Mowing and haymaking
The conservation of values inherent in areas of old natural and semi-natural land used to produce fodder requires yearly and well-adapted management. The work has to be carried out at appropriate times, using suitable equipment. Biology and cultural history are the main considerations in today's meadow management. Spring clearing, mowing, raking, hay removal, and after-treatment are the main elements of meadow management.

Grazing with focus on conservation
Natural and semi-natural pastures, as opposed to cultivated pastures, have never been artificially fertilised, ploughed, drained or cultivated with ley. Often, they have a long history of grazing. Typical for species in natural pastures is their ability to withstand grazing. Plants that are grazed often form new shoots from the base. In vegetation that has been grazed short, light is in good supply and allows plants to grow close together without overshadowing. From a nature conservation point of view, dense swards are the most distinctive feature of a well-managed semi-natural pasture. From a heritage point of view, clearly visible

cultural remains are important.

The intensity (number of animals) is adapted to the availability of grazing and to the character of the pasture. Additional fodder should not be given. Shrubs, brush-wood and plants rejected by the grazing animals should be cleared annually, after the grazing period. Cultural remains in the pastures require regular maintenance.

Restoration
Before restoring old unmanaged fodder-producing areas, the following considerations should be made: Which species of flora and fauna favoured by grazing still exist and can expand? Do most grassland species have to be reintroduced or can they be brought to life from a seed reserves in the ground? Is the grass cover fragmented or are there large areas of continuous swards? Is the area affected by nitrogen fertilisers? Restoration must always be followed by continuous traditional management.

Farming with environmental and conservation considerations
Management of cultivated land should ensure that cultural traces, such as open ditches, clearance cairns, meadow barns, stone walls, prehistoric graves and settlements are left intact. Efforts should be made to create protected zones around sensitive environments such as watercourses, wetlands and natural meadows.

Traditional farmland
Traditional farmland should be maintained.

DISTRIBUTION

12.6. Sixth type of habitat/land cover: Built-up areas See ecosystems below

National environmental quality objectives
A Good Built Environment; Clean Air; A Non-Toxic Environment; Reduced Climate Impact; A Protective Ozone Layer; A Safe Radiation Environment; Zero Eutrophication; A Rich Diversity of Plant and Animal Life.

Urban settlements (regional)
Within the proposed biosphere reserve there are three towns and a number of peripheral municipalities. These areas are characterised by planned structures where the natural environment has been replaced by constructions, impervious surfaces and planned green areas. The urban centres have grown up around trade, administration and industry.

The urban environment contains a variety of microhabitats. Recreational areas, parks, gardens, disused wasteland, water areas, etc., provide habitats for many species of flora and fauna. Adaptation to an urban environment, offering food and protection from predators, has allowed some species to thrive. Buildings and other constructions also house flora and fauna, and often replace natural habitats.

Rural settlements (regional)
Building in the countryside is relatively evenly distributed. With the exception of the outer archipelago, the whole area is inhabited. The area is marked by the far-reaching enclosures that took place in the 19th century, when many villages were broken up. Some village formations, however, still remain.

There are also a large number of summer/weekend homes in the rural areas, often linked to water or the natural environment. In places, these are built in dense clusters.

Historically, rural settlements and agriculture have fragmented the natural environment and created new biotopes. Cultivated plants provide new sources of food for animals, and other biotopes have been pushed back. In modern society, recreational housing has reduced the area of untouched shoreline.

Manor house environments (local)
Several remarkable 18th century country estates remain is the area. The finest example of Gustavian architecture is found at Hellekis manor on Mount Kinnekulle. The western side of Mount Kinnekulle is dominated by manor houses. As a result of this historic manor house environment, a park landscape was created on Mount Kinnekulle, dominated by large trees. There are around 1,500 large oaks on the mountain, and their bark contains more than 1,000 species of animals.

Other country estates in the proposed biosphere reserve include Läckö, Stola, Traneberg, Senäta, Apelås, Börstorp Castle and Stora Ek. These estates are not clustered like on Mount Kinnekulle, but they provide clear evidence of the manor house influence on the landscape.

Infrastructure (regional)
Within the proposed biosphere reserve there are several high-traffic roads (e.g. E 20, national roads 26 and 49) with private as well as freight traffic. A fine-meshed network of small roads also exists. The Kinnekullebanan railroad crosses the area. Special biotopes occur in connection with roads and railroads, e.g. banks and central reservations. Roads and railroads can also act as barriers, affecting species that require access to large areas.

Lidköping has a commercial port, and fairways to this port and other ports in Lake Vänern traverse the waters included in the proposed biosphere reserve. Guest harbours and pleasure boat marinas are scattered throughout the area. Göta Canal, one of the most popular tourist attractions in Sweden, is a historic transport route linking Lake Vänern with the Baltic Sea.
The area is criss-crossed by power-lines and radio and telecommunication devices.

12.6.1. Charachteristic species:

Group	***Scientific name***	***English common name***
Vascular plants	*Acer*	Maples
	Aesculus hippocastanum	Horse Chestnut
	Anthriscus sylvestris	Cow-Parsley
	Bellis perennis	Daisy
	Betula pendula	Silver Birch
	Fraxinus excelsior	Ash
	Quercus robur	Oak
	Taraxacum	Dandelion
	Tilia cordata	Small-leaved Lime
	Trifolium pratense	Red clover
	Trifolium repens	White clover
	Tussilago farfara	Colt's-foot
	Ulmus glabra	Elm
	Urtica dioica	Common Nettle
	Veronica chamaedrys	Germander
Lichens	*Xanthoria parietina*	Orange Wall Lichen
Mammals	*Capreolus capreolus*	Roe Deer

	Eptesicus nilssonii	Northern Bat
	Erinaceus europaeus	Hedgehog
	Meles meles	Badger
	Plecotus auritus	Brown Long-Eared Bat
	Rattus norvegicus	Brown Rat
	Sciurus vulgaris	Squirrel
Birds	*Anas platyrhynchos*	Mallard
	Carduelis spinus	Siskin
	Columba palumbus	Woodpigeon
	Corvus monedula	Jackdaw
	Ficedula hypoleuca	Pied Flycatcher
	Fringilla coelebs	Chaffinch
	Larus canus	Common Gull
	Parus caeruleus	Blue Tit
	Parus major	Great Tit
	Passer domesticus	House Sparrow
	Passer montanus	Tree Sparrow
	Pica pica	Magpie
	Sitta europaea	Nuthatch
	Sturnus vulgaris	Starling
	Turdus merula	Blackbird
	Turdus pilaris	Fieldfare
Reptiles and amphibians	*Bufo bufo*	Common Toad
	Natrix natrix	Grass Snake
	Rana temporaria	Common Frog
	Vipera berus	Adder/Viper
Arachnids	*Lycosidae spp*	Wolf Spider
	Tegenaria domestica	Common House Spider
Insects	*Aglais urticae*	Small Tortoiseshell
	Gonepteryx rhamni	Brimstone
	Inachis io	Peacock
	Musca domestica	Houseflya
	Pieris brassicae	Large White
	Tinea pellionella	Casemaking clothes moth
	Tineola bisselliella	Webbing clothing moth

12.6.2 Important natural processes:

Flood risk
The effects of flooding are reinforced since the environment is affected by ditching, run-off from impervious surfaces, embankments, etc.

Heat islands
Towns and urban developments create heat islands, where the local climate is significantly warmer than the surrounding areas.

12.6.3 Main human impacts

Land requisition
Expansion and rebuilding of urban areas and the construction of infrastructure leads to a constant change in the microhabitats created in such environments. The development of summer cottages and permanent

housing is land-demanding and alters the conditions of the open cultivated landscape.

Management of parks and other green urban areas
The management of gardens, parks and other green urban areas is of great importance for creating biotopes in the built-up environment.

Air, water and soil pollution
Built-up areas contribute to the pollution of air and water. Point-source emissions have great local impact. Pollution also has a general impact on the environment by changing the nutritional balance. Alien or hormone disturbing substances that enter the environment affect individual organisms and cause the decline or elimination of populations of certain species, while other species may be favoured.

Favoured/disadvantages species
Human activities have favoured some species at the expense of others. This causes changes to the ecosystems. Animals and plants that have adapted to and benefit from the new environments have increased their populations. Such species have also altered their life-patterns. Species that have been unable to adapt have declined or completely disappeared from built-up areas.

Noise
Noise has become an increasing disturbance. It is important to minimise noise pollution in nature areas close to urban developments for the sake of recreation and animal life. People often cite traffic as the worst type of noise disturbance. In urban areas, noise is mainly caused by cars and buses, while residents living in rural areas are more disturbed by heavy vehicles and trains.

Wastewater & stormwater
Buildings in urban areas are connected to municipal wastewater and stormwater systems. All wastewater must be treated before being discharged into recipients. Some large industries have their own treatment plants for industrial wastewater. Rural buildings must have their own surface water treatment facilities.
The construction of extensive pipe line systems for the collection of polluted water means that water is collected and concentrated to certain discharge points. These may be locally affected by bacteria and viruses as well as by nutrients and other chemical substances. Issues related to the impact of hormone-like substances and traces of pharmaceuticals receive increasing attention. Even with successively improved treatment methods, the discharge of treated wastewater from urban areas has an effect on Lake Vänern and its tributaries. There are significant deficiencies in the treatment of water from isolated buildings in rural areas, which carries a risk of increasing levels of nitrogen in the ground water.

12.6.4 Relevant management practices

Management of green urban areas
Green urban areas in the built-up environment are managed and maintained by municipally owned or outsourced companies.

General planning
Land use is controlled by comprehensive plans.

Reduced pollution

Urban environments contain large impervious surfaces and water is led from these via stormwater pipes. Stormwater may be polluted from overflow of the stormwater network and from building materials, road traffic, etc. Impervious surfaces imply a long term risk for the lowering of the ground water table and flooding in heavy rains. Stormwater is mainly untreated when discharged into recipients. Work is underway to improve the local treatment of stormwater. Handling stormwater in open systems benefits the built-up environment and makes the water processes visible.

Water resource management
Water resource management strives for an ecologically and economically sustainable use of the resource, where the handling of certain activities, such as flood risk, water flow and water levels is regulated.

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.]

Microhabitats in the cultivated landscape
Microhabitats remain in the cultivated landscape around Mount Kinnekulle and Kållandsö, but also in the plains around Mariestad. Such biotopes are important for a number of species of flora and fauna as they provide places of refuge in the otherwise severely affected landscape. This concerns for example butterflies, birds, bats and even some larger animals. When these microhabitats are close together, so that individuals can migrate from one to another, they may ensure the survival of the species in the area. Old trees and fruiting bushes are of particular importance, as they provide both protection and food.

General biotope protection applies to avenues, springs, clearance cairns, willow banks, minor expanses of water and wetlands set in agricultural land, stone walls set in agricultural land, and field mounds. In addition to general biotope protection, the County Administrative Board has decided to establish some ten special biotope protection zones in meadows and pastures. Several of the microhabitats are included in existing nature reserves.

Rocky shores/flat-rock pine forest
The islands in the Mariestad archipelago, Djurö archipelago, parts of Kållandsö and Tådene archipelago, and Vara forest contain many rocky shores in connection with dry flat-rock forest.

By the end of the last Ice Age large areas were under water, since the weight of the ice depressed the land. As the water sank, the shoreline successively moved and the land was affected by surging waves. In exposed areas, finer material was swept away, leaving rocky and shingle shores. As the land has risen, these have become forested with trees adapted to a nutrient-poor environment. Pine, with its ability to withstand drought, dominates the tree layer. The trees are slow-growing and are often contorted when growing in areas exposed to wind. A mature flat-rock pine forest usually only contains sporadic shrubs, and the field layer is species-poor and scrubby. The moss and lichen layer, on the other hand, is often well-developed. Flat-rock pine forests provide a rich insect life with wood-living species, which in turn provide food for woodpeckers such as black woodpecker *(Dryocopus martiu)* and great spotted woodpecker *(Dendrocopos major)*. In the archipelago, flat-rock pine forests also provide nesting places

for white-tailed eagle *(Haliaeetus albicilla)* and osprey *(Pandion haliaetus)* which require large pine trees for their nests. Flat-rock pine forest is a major feature in the Djurö national park archipelago and in the nature reserves on the islands of Kalvö, Brommö and Onsö.

Reed bays

Lake Dättern, Sjöråsviken bay and protected bays in the Mariestad archipelago (e.g. Fågelöviken), Mariestadsfjärden bay (e.g. Börstorpsviken, Gummerstadsviken and Björsätersviken) and areas around Kållandsö are home to contiguous belts of vegetation, dominated by aquatic plants such as reeds *(Phragmites autralis)* and reed sweet-grass *(Glyceria maxima)*.

Many species have adapted to finding food and habitation in these reed belts. Mosaic-like reed areas interspersed by open water include a great diveristy of insects. Above the water surface live species of half-wings *(Hemiptera)*, mosquitoes *(Culicidae)*, moths *(Noctuidae)* and butterflies *(Lepidoptera)*. Under water live non-biting midges *(Chironomidae)* and aquatic sowbugs *(Asellus aquaticus)*.

The vast number of insects and small creatures provide food for birds such as swans, geese and ducks *(Anatidae)* and insect feeders such as Savi's warbler *(Locustella luscinioides)*, great reed warbler *(Acrocephalus arundinaceus)* and bearded tit *(Panurus biarmicus)*. The tender reed shoots are a favourite food for different species of geese. Several threatened bird species are linked to the reed areas. Bittern *(Botaurus stellaris)* nests among large, dense reeds where there is a good supply of fish, frogs and water insects. Marsh harrier *(Circus aeruginosus)* preys on voles and muskrats *(Arvicolines)* and young waterfowl. They hunt up to 5 km from the nest, which is often located in thick reeds. Grey heron *(Ardea cinerea)* requires access to shores or wetlands for their food, which mainly consists of frogs, small rodents and insects.

Many species of fish, mainly whitefish, remain in and around the reeds as alevins, to gain protection from predators.

The reed bays in Lake Dättern are partly included in nature reserves and constitute a Ramsar site. Otherwise, reed bays are normally covered by shore protection, which for Lake Vänern is 300 metres.

Rapids, river ravines and spawning grounds

Downstream of Ullervad, the river Tidan has some stretches of fast-flowing water. These offer oxygen-rich environments, where many species of aquatic insects and other bottom-living animals thrive, for example mayflies *(Ephemeropteera)*, caddiesflies *(Trichoptera)* and flies *(Diptera)*. The availability of food and oxygen makes these areas into important spawning grounds for several fish species in Lake Vänern. Asp *(Aspius aspius)* and smelt *(Osmerus eperlanus)* migrate upstream in the spring, while brown trout *(Salmo trutta)* migrate in September – October. Species such as perch *(Perca fluviatilis)* and chub *(Leuciscus cephalis)* occur permanently in these waters. The mouth of the river Tidan is now a fishery conservation area and has also been designated as an area of national interest. Other rapids are found at the mouth of the river Sjöråsån and in the river Mariedalsån.

The shallow areas north and north-west of the islands in the Mariestad archipelago, east of the Djurö archipelago, in Kinneviken, and north and west of Kållandsö constitute important spawning grounds for whitefish *(Coregonus lavaterus)* and vendace *(Coregonus albula)* which spawn in late autumn on firm bottoms. Lake Dättern and Mariestadfjärden are important spawning areas for pike-perch *(Sander lucioperca)* which require shallow bays that warm up in early spring. The bottoms can be soft or hard with some vegetation. Perch *(Perca fluviatilis)* spawn here in the spring, either on stony bottoms or in areas of flooded shore vegetation. Pike *(Esox lucius)* spawn in flooded shores or in shallow bays during March-

May.

Old-growth forest
Old, untouched natural forests that are allowed to develop without human intervention are particularly species-rich and contain high natural values. Many plants and animals thrive in this environment, contributing to the biological diversity.

Untouched forests contain fallen trees, dry standing trees and decaying wood. This contributes to a diversity of habitats that favour flora and fauna. Dead wood is an important resource for a great many species of forest flora and fauna. It provides food, habitat, protection and building material for a number of more or less rare species. Polypores, wood-living fungi, wood-decaying fungi and insects thrive in this environment.

All forests in the proposed biosphere reserve have, to varying degrees, been affected by human activities, but in the old-growth forest in Kedum-Torpa nature reserve, human impact has been non-invasive. The forest exhibits the characteristics of a natural mixed coniferous forest interspersed with isolated deciduous trees such as birch, aspen, rowan and oak. The forest is around 150 years old but includes several pines that have reached an age of 200 years. The orchid, creeping lady's-tresses *(Goodyera repens)*, is fairly abundant, and yellow bird's-nest *(Monotropa hypopitys)* also occurs in some areas.

However, the proposed biosphere reserve contains forests that could develop values inherent in old-growth forest. The forest reserve Lindbergska provytan and some of the islands in the archipelago owned by the diocese are relatively untouched and could develop into old-growth forest.

Seasonally inundated grassland
Seasonally inundated grasslands are drastically declining in Sweden. This type of open grassland provides a species-rich environment, containing many rare and threatened species of flora and fauna. Sand bittercress *(Cardamine parviflora)*, greater bur-marigold *(Bidens radiata)* and marsh gentian *(Gentiana pneumonanta)* are examples of plants that grow on wet and muddy shores and are favoured by grazing and varying water levels. The water fringe between the wet grassland and the reed belt provides a highly valuable environment for many birds, insects and amphibians. The water fringe serves as a nursery for many species of fish. Fry develop quickly in the warm, insect-rich water. To keep the water fringe open, the grassland must be grazed or mowed. The proposed biosphere reserve is located along a bird migratory route. This means that the wet grasslands here have extra high values as they provide excellent feeding and resting places for a large number of birds. Wet grasslands are scattered all along the coast of Lake Vänern in the proposed biosphere reserve.

Wet forests
There are different types of wet forests within the proposed biosphere reserve. Shoreline alder forests and alder carrs are the most commonly occurring types. Wet forests are found at Östra Sannorna and on the island of Torsö.

Shoreline alder forest
Shoreline alder forests colonise the shores of metrosophic and eutrophic lakes, often in connection with lake lowering over the last 200 years. Hydrologically, stands depend on the water level variations in the lake; hummocks often form here. The shurb and field layer is home to shoreline species such as grey sallow *(Salix cinera)*, gypsywort, *(Locopus europaeus)*, bittersweet *(Solanum dulcamara)*, bulrush *(Typha latifolia)* and slender tufted-sedge *(Carex acuta)*. Valuable features in this type of deciduous forest

include hummocks, submerged fallen trees, old trees such as alder (*Alnus glutinosa*) and crack willow (*Salix fragilis*), high stumps and dead standing trees. The forest contains a great number of red-listed species.

The shoreline alder forest at Östra Sannorna is unique in the county for its size. It has also been classified as a key woodland habitat.

Alder carrs
Alder carrs are found in depressions in the terrain. These habitats are characterised by stagnant or slow-flowing water. Alder carrs are often small. A typical alder carr contains large elevated hummocks. Mosses, ferns, herbs and sedges are distributed over areas that are otherwise almost devoid of vegetation, on waterlogged ground which is covered by water during large periods of the year. Such environments may contain a number of species of conservation interest. An interesting flora of cryptogams can be expected on the alder hummocks including signal species and red-listed species. The soils are organic peat soils. The field layer contains the signal species bog arum *(Calla palustris)* and elongated sedge *(Carex elongata)*, as well as yellow loosestrife *(Lysimachia vulgaris)*, narrow buckler-fern *(Dryopteris carthusiana)*, common meadow-rue *(Thalictrum flavum)*, skullcap *(Scutellaria galericulata)*, milk-parsley *(Peucedanum palustris)* and common marsh-bedstraw *(Galium palustre)*.

Wet pine forest
In wet pine forests, the trees grow slowly and very old, contorted pines occur. Ospreys *(Pandion haliaetus)* sometimes build their nests in such trees. Dead wood occurs in the form of standing and fallen dead trees. Other species of trees in the biotope include white birch *(Betula pubescens)* and alder *(Alnus glutinosa)*. Signal species occurring in wet pine forests include spike lichen *(Calicium parvum)*, needle lichen (*Chaenotheca gracillima*) and forked hair-lichen *(Bryoria furcellata)*.

Bird skerries
Bird skerries, with little or no vegetation, are breeding places for sea gulls and terns. They are a key habitat for many of the seabirds in Lake Vänern. Lesser black-backed gull *(Larus fuscus)* and great black-backed gull *(Larus marinus)* which normally only occur along sea coasts are also found in Lake Vänern. Great cormorant (*Phalacrocorax carbo*) is very common in Lake Vänern and breeds on islets. They are easily distinguished by the dead trees full of large black birds, with no other vegetation. Cormorant droppings are rich in ammonia which destroys all vegetation, and the birds completely colonise the islands.

Many species of gull nest in colonies, together with birds that are otherwise found much further towards land. These birds benefit from the gulls' collective defense by nesting next to them. Mallard *(Anas platyrhynchos)*, gadwall *(Anas strepera)*, red-breasted merganser (*Mergus serrator*), oystercatcher *(Haematopus ostralegus)* and black-throated diver *(Gavia arctica)* are species that accompany gulls.

In recent years, the bird skerries have increasingly become overgrown by shrubs. This means that they are less suitable as breeding habitats since the brooding birds must have a clear view around the nest in order to detect predators.

The bird protection areas were recently reviewed, resulting in some of them being removed and others added to the list of protected sites. It is also possible for private individuals and associations to adopt a bird skerry, which entails the responsibility for clearance work.

Alvar areas/limestone pavement

”Alvar” are flat-rock areas occurring on hard limestone found only in a few places in the world. Limestone pavements are a result of the co-existence between human cultivation and natural conditions over thousands of years. Alvars are home to a great number of plants and animals – many of which are rarely found anywhere else. Limestone pavements are characterised by only a thin layer of soil, significantly varying water supply, hard climate and a unique flora and fauna.

Within the proposed biosphere reserve, alvar areas only occur on Mount Kinnekulle. Some 70 per cent of the world’s alvar areas are found on the Swedish islands of Öland and Gotland, but in Sweden there are also small limestone pavements in Västergötland. The largest limestone pavement on the Swedish mainland is found in the nature reserve Österplana hed och vall on Mount Kinnekulle, located on the 50 metre thick limestone strata.

Flora and fauna are rich in species, but the living conditions are harsh. Many of the species have adapted to living in this very special environment. During the winter, different freezing phenomena stir the limestone gravel, and during spring and autumn, flooding is common. In the summer, on the other hand, there is a shortage of water as the thin soil dries out quickly.

In the limestone pavements on Mount Kinnekulle, the thickness and moisture content of the soil vary. This results in a mosaic of different environments, with a diversity of species. The biggest threats to the limestone pavements are the cessation of grazing and encroachment. As a rule, the alvar areas on Mount Kinnekulle have a long tradition of grazing, and continuous management is a prerequisite for the survival of the large variety of species. Further areas of limestone pavement have been restored in an EU project carried out on Mount Kinnekulle during 2002-2007. The limestone pavements on Mount Kinnekulle are included in the EU network of protected areas and have been designated as nature reserves.

Broadleaf forest

Broadleaf trees are species such as elm, ash, hornbeam, beech, oak, small-leaved lime and Norway maple. Broadleaf forests contain mainly such species. During the warm period 7,000 years ago, large parts of southern Sweden were covered in broadleaf forest. Since then, these forests have declined, mainly for two reasons: they have been converted into land for cultivation, and the climate has become harsher. Broadleaf forests are often affected by grazing and forestry.

Many of today’s broadleaf forests are so called secondary forests, i.e. they have re-colonised on land that was used for grazing and haymaking until the early 1900s. Broadleaf forests are a vital part of the cultural landscape. They are often found near settlements and are important for recreation and outdoor life. There has been a new shift towards multiple-use forestry.

A third of all threatened and near threatened wood-living plants in Sweden belong to the broadleaf forest. This type of forest can grow on a variety of soils, for example on slopes and screes and in river valleys. Scientists claim that we are going towards a warmer climate, which would favour the growth and competitiveness of broadleaf forest.

Large areas of broadleaf forest grow on Mount Kinnekulle, favouring the alum shale soil and the sandstone and limestone slopes. Most of the broadleaf forests on the plateau mountain were formerly pastures or meadows. Large areas of broadleaf forest are designated nature reserves and are included in the Natura 2000 network.

In the eastern part of the proposed biosphere reserve, the most valuable broadleaf forests are found on the slopes of Mount Lugnåsberget.

There are also several broadleaf forest environments with high conservation values along the coasts of Lake Vänern. Examples are the beech forest on Surö, south of Sjötorp, Svenäs udde, north of Sjötorp, and valuable oak environments around Stola manor and in Parkudden nature reserve in the western part of the proposed biosphere reserve.

Oak pastures

Oak pastures depend on continuous management, the most important being traditional methods to keep the biotope open. Old oaks are home to a great many species of insects, fungi and lichens. As many as a million plants, animals and fungi can live in a single oak tree growing in an open, sun-lit position.

Oaks are believed to be able to reach and age of more than 1000 years. In very old trees, wood mould gathers in the trunk. It looks like fine sawdust and consists of semi-decomposed wood mixed with dead insects, droppings and leaves. Many different types of beetles and other insects live in the wood mould and feed from the tree. Oaks with wood mould are rare in today's landscape. On Mount Kinnekulle, however, the old oaks are home to an extremely rich variety of insect species. They include the hermit beetle *(Osmoderma eremita)* (EU-listed), timber beetle *(Lymexylon navale)* and cardinal click beetle *(Ampedus cardinalis).*

Within the proposed biosphere reserve, Mount Kinnekulle is noted for its unusually large number of large, old deciduous trees. Many of these trees are old ornamental trees or stand in avenues, but most of them grow in grazed pastures. The oak enjoys a special position, and the oak pastures are often located close to the large estates. The magnificent old trees give huge character to the landscape. The many oak pastures on the western side of Mount Kinnekulles make the mountain one of the most valuable oak tree areas in the whole of Europe. Many of these oak pastures are now designated nature reserves and are included in the Natura 2000 network.

There are several areas of valuable oak pastures along the coast of Lake Vänern. Ekudden, Storeberg, Skansen Läckö nature reserve, and Torsängen nature reserve outside Lidköping are good examples. Other areas include Klosterängen nature reserve on Mount Lugnåsberget and Mariedal outside Götene.

Rich fens

Rich fens are characterised as being the most species-rich fens with many specialised species of vascular plants, mosses, terrestrial molluscs and fungi. Of the at least 160 nationally red-listed species, 74 are listed as threatened and 20 are protected.

A reasonable estimate is that 2-3 per cent of the total fen area in the country are rich fens, which is the equivalent of 2-3 per mille of Sweden's total surface area. In the past, rich fens were often mowed or grazed, which stopped encroachment and favoured biodiversity. Today, traditional management is rare and ditching to obtain more land for cultivation and forestation has had a devastating effect on rich fens.

Skebykärret is a fine example of a rich fen within the proposed biosphere reserve. It is located in a part of the county where this type of vegetation is otherwise rare. Reeds have invaded the area, and need cutting annually. The flora includes brown bog-rush, *(Schoenus ferrugineus)*, *(Carex ceposita)*, broad-leaved cottongrass *(Eriophorum latifolium Hoppe)*, bird's-eye primrose *(Primula farinose)*, early marsh-orchid *(Dactylorhiza incarnate)*, etc. The bottom layer is dominated by pointed spear-moss (*Calliergonella cuspidata*), tall thyme-moss (*Plagiomnium elatum)* and mollusc ctenidium moss *(Ctenidium molluscum)*. The area also includes the red-listed species round-mouthed whorl snail *(Vertigo genesii)* and Geyer's whorl snail *(Vertigo geyeri).* Skebykärret rich fen is a Natura 2000 site.

Mount Kinnekulle has several rich fens, calcareous wet meadows and spring-influenced soils in designated nature reserves.

Meadows/hay meadows
Hay meadows and pastures contain a large proportion of the natural and cultural values of the cultivated landscape. Only a fraction of the meadows and pastures that existed around the turn of the 20th century still remain, as a result of agricultural rationalisation. Meadows and pastures require management by way of mowing or grazing in order to retain their values.

The cultivated landscape has been created by man over a very long period of time and varies from place to place. The biggest threats to the cultivated landscape are agricultural reforms and declining profits for farmers. Size rationalisation of farms has led to many valuable pastures, microhabitats and culturally significant landscape elements not being managed, which constitutes a threat to both biodiversity and cultural heritage. Hay meadows, which are of great cultural history value and include many threatened species, hold no economic significance for farming today. The number of birds in the cultivated landscape is drastically declining, and many meadow and pasture plants are threatened. In many areas, the lack of grazing animals and active users is a problem, linked to the lack of profitability in animal production.
Well-kept meadows with an unbroken continuity of management do not exist within the proposed biosphere reserve. There are, however, examples of meadows that have been restored. These now include a flora characteristic of hay meadows. Old maps show that the land was once used as meadowland.
Within the Mount Kinnekulle nature conservation area, several sites have been restored as meadowland and are included in new nature reserves.

Natural pastures
Characteristic for natural pastures is that they have not been subject to cultivation measures in modern time (in order to increase production), been improved with machinery, fertilised, limed, cleared of stones, drained or cultivated with forage crops. No artificial fertilisers have been added to the natural pastures, and the shortage of plant nutrients, mainly nitrogen, in combination with traditional and continuous grazing, has provided favourable survival conditions for many plant species.

The openness and availability of light are significant for both plants and animals. The herb-rich and often sunny grassland favours many species of insects. They, in turn, provide food for birds, which is especially important during the breeding season. Many butterflies also thrive here. The proposed biosphere reserve includes many valuable natural pastures, especially in the western part and on Mount Kinnekulle.

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.]

Within the proposed biosphere reserve there are at least 171 species on the national Red List in the categories vulnerable (VU), endangered (EN) and critically endangered (CR). Some 50 species are EU-listed, of which 33 are listed in the Birds Directive, and 20 species are listed on the global Red List (IUCN).

Mammals
Within the proposed biosphere reserve there are 6 globally red-listed mammals. Barbastelle bat

(*Barbastella barbastellus*) and pond bat (*Myotis dasycneme*) as well as otter (*Lutra lutra*) occur in a few places within the proposed biosphere reserve, while hazel dormouse (*Muscardinus avellanarius*), red squirrel (*Sciurus vulgaris*) and beaver (*Castor fiber*) are found at several sites.

Birds
A large number of threatened bird species breed annually within the proposed biosphere reserve. Lake Dättern is classified as a wetland of international importance, Ramsar, and parts of this site, around 410 ha, are included in the proposed biosphere reserve. The large number of islands, islets and skerries in the Lake Vänern archipelago contribute to the variety of breeding environments favouring many bird species.

The area includes 33 species listed in the EU Birds Directive, of which the corncrake (*Crex crex*) is also listed as near threatened (NT) on the global Red List. A large number of birds breeding in the area are also on the national Red List, of which 17 species are classified as endangered (EN) or vulnerable (VU). A further 8 species listed as near threatened (NT) on the national Red List are found in the area. Of these, seabirds such as white-tailed eagle (*Haliaeetus albicilla*) and curlew (*Numenius arquata*) are worth mentioning. Bittern (*Botaurus stellaris*), great reed warbler (*Acrocephalus arundinaceus*) and shoveler (*Anas clypeata*) are species that depend on wetlands.

Fishes
Lake Vänern is the third largest lake in Europe and contains 38 species of fish. Of these, two are on the global Red List as near threatened: river lamprey (*Lampetra fluviatilis*) and brook lamprey (*Lampetra planeri*). A further five fish species are included in the EU Habitats Directive: asp (*Aspius aspius*), salmon (*Salmo salar*), spined loach *(Cobitis taenia),* houting (*Coregonus oxyrhynchus)* and bullhead *(Cottus gobio*). Eel (*Anguilla anguilla*) is another interesting species that is on the national Red List as critically endangered (CR).

Small watercourses are spawning areas for the lake-migrating brown trout (from the river Tidan) (*Salmo trutta lacustris)* and salmon (*Salmo salar*), while the shallow bays and archipelago areas are spawning grounds for pike-perch (*Sander lucioperka*).

The Lake Vänern Society for Water Conservation has identified special consideration species that are important for the lake since a large part of their collected population in Europe is found here. They include: Gullspång salmon *(Salmo salar, Gullspång population),* Klarälv salmon *(Salmo salar, Klarälv population),* asp (*Aspius aspius*), osprey *(Pandion haliaetus),* common tern *(Sterna hirundo),* black-throated diver *(Gavia arctica),* bittern *(Botaurus stellaris)* and sand bittercress *(Cardamine parviflora).*

Insects
The Apollo butterfly (*Parnassius apollo)* is rare in the Lake Vänern area and is listed as vulnerable (VU) on the global Red List. Reasons for the drastic decline since the 1950s of this butterfly include the fragmentation of habitats, and the disappearance of flower-rich meadows due to cessation of mowing, or encroachment. The large blue butterfly *(Maculinea arion)* is listed as near threatened (NT). Further species occurring in the area and listed on the national Red List as near threatened (NT) include (*Nothorhina punctata),* antlion (*Myrmeleon bore)* and (*Arachnospila wesmaeli).*

Reptilies and amphibians
Within the proposed biosphere reserve, great crested newt (*Triturus cristatus*) and smooth snake (*Coronella austeriaca*) occur occasionally. Great crested newt is included in the EU Habitats Directive and smoth snake is classified as vulnerable (VU) on the national Red List.

Arachnids
Anthrenochernes stella lives in the wood mould in old hollow trees such as beech, small-leaved lime, oak and aspen. Is is found in forest-like parks and in pastures dominated by broadleaf trees. This insect has a high conservation value as its presence signals the occurrence of other red-listed species. The species is included in the EU Habitats Directive and protected under the Natura 2000 network. In Sweden, the insect is listed on the national Red List as near threatened (NT).

Philodromus praedatus is a miedum-size spider found on Mount Kinnekulle. The species is found in large, solitary oaks and is on the national Red List as near threatened (NT).

Molluscs and leeches
Geyer's whorl snail (*Vertigo geyeri)* and round-mouthed whorl snail *(Vertigo genesii)* live mainly in rich fens and calcaerous wet meadows. Within the proposed biosphere reserve, these biotopes are found on or around Mount Kinnekulle. Direct threats to these species include drainage and other activities that affect the local hydrology. The species are protected under the EU Habitats Directive and the national Red List, and are also listed on the global Red List.

Macrogastra ventricosa occurs on Mount Kinnekulle, and is mainly found in broadleaf forests and calcareous soils. The species is on the national Red List as near threatened (NT).

Medical leeches (*Hirudo medicinalis)* are found along the shores of Lake Vänern and in ponds and other stagnant waters. The species is classified as near threatened on both the global and national Red Lists.

Vascular plants and charales
A great number of threatened vascular plants are found in the proposed biosphere reserve. Of these, 44 are classified as vulnerable (VU) or endangered (EN) on the national Red List. Around Lake Vänern there are 53 rare or threatened species of vascular plants and charales.

Lady's slipper (*Cypripedium calceolus)* and smartweed (*Persicaria foliosa*) are included in the EU Habitats Directive and thereby protected under the Natura 2000 network. Smartweed is classified as vulnerable (VU) on the national Red List, while lady's slipper, being an orchid, is protected in Sweden. Slender stonewort (*Nitella gracilis*) occurs in the area. This charale is classified as endangered (EN) on the national Red List.

Mosses
Green shield-moss (*Buxbaumia viridis*) and tortella moss *(Tortella rigens)* are both included in the EU Habitats Directive and thereby protected under the Natura 2000 network. Some 17 species are listed on the national Red List, of which 15 are classified as vulnerable (VU). Wavy beard-moss *(Didymodon sinuosus)* and Teesdale feather-moss *(Rhynchostegiella teneriffae)* are endangered species (EN).

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.]

Species of traditional importance
Fishing, agriculture, forestry, hunting, and berry and fungi picking were traditionally of great importance. The estates also had large fruit orchards, including many varieties of apple that were typical for the area.

The dog breed Västgötaspets (Swedish Vallhund) was common in the area, and is believed to be one of the oldest breeds in the country. North Swedish horse and Swedish Ardennes were traditionally important, and Sweden's first Ardennes stud was located near Mount Kinnekulle. Within agriculture the main crop was oats, used as fodder for horses.

The most important species within various traditional areas of activity:

Fishing: *vendace, salmon, brown trout, pike-perch, pike, perch, lake, crayfish*
Hunting: *moose, roe deer, hare, ducks, woodcock, pigeon, geese*
Agriculture: *oats*
Animal husbandry: *Swedish Friesian cattle (SLB), North Swedish, Ardennes*
Forestry: *Norway spruce, pine, birch, alder, rowan, ash, oak, hazel, juniper*
Fruit and berries: *apples (Kavlås, Melonäpple, Husmoderäpple, Kinnekulle kantäpple, Kållandsö, Leckö astrakan), wild cherry, sour cherry, whiteheart cherry, black currant*

Species of economic importance
Today, fishing, agriculture and forestry are of great economic importance in the area. Agriculture dominates in the south-western part of the proposed biosphere reserve, while forestry is the major industry in the north-east. The major crops are cereals. Spelt (*Triticum spelta*), one of the oldest grains in Sweden, has a high economic value. Spelt is grown mainly on Gotland, but interest and acreage are increasing in other parts of the country, including the proposed biosphere reserve. The economically most important fish species are pike-perch followed by vendace and whitefish. The productive forest is mainly coniferous.

Today's most economically important species within various traditional areas of activity:

Commercial fishing, angling and fishing for household requirements: *pike-perch, vendace, whitefish, eel, brown trout, pike, perch*
Agriculture: *cereals (winter wheat, rye, oats), oil plants, leguminous plants, potato*
Animal husbandry: *fowl, pigs, cattle, horses, sheep*
Forestry: *pine, Norway spruce*
Fruit and berries: *strawberries (Honeoye, Polka), apples (Aroma, Amorosa, Katja, Ingrid-Marie), raspberries (Glen ampel)*

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

The status of biosphere reserve and the associated working methods bring a range of benefits. On the local level, the biosphere reserve constitutes a forum for cooperation and participation, where ideas are born and new opportunities identified. Successful work for sustainable development also provides a platform for profiling of the area. This is something that benefits everyone who is active in the biosphere reserve.

During the local process of becoming a biosphere reserve, a number of initiatives have been made with the aim to promote economic and human development which is socio-culturally sustainable. The proposed biosphere reserve has been a driving force or a central stakeholder in a number of projects. In addition, there are a number of on-going initiatives in municipalities and among local and regional stakeholders where the biosphere reserve plays a natural part. The projects and initiatives have often been pilot activities since no similar national or international projects were identified. Such projects include *Sustainable travel for soft tourism* and *Product development for eco-tourism*, described below. Here follows a description of the prerequisites for promoting sustainable development in the region, and of initiatives that are being carried out in the proposed biosphere reserve.

14.1.1 Day-to-day outdoor recreation is most important for local residents

The proposed biosphere reserve includes large geographical areas that are well suited for outdoor activities, with facilities such as hiking trails, cycle routes, bird towers, wind shelters, etc. Outdoor recreation contributes to the social aspect of sustainable development since it is of great importance for public health and improved quality of life. A basic prerequisite for outdoor recreation is the Swedish *Right of Public Access* which gives everyone the freedom to roam the countryside under the provision "Don't disturb – don't destroy". For people living in the area, day-to-day outdoor recreation is vital. Areas of attractive countryside close to population centres are especially important.

The proposed biosphere reserve includes four areas that are of national interest for outdoor recreation:

- *Djurö archipelago; Brommö – Torsö - Fågelö (49 225 ha):* A large archipelago area with high natural values, mainly comprising water. The Djurö archipelago is the most isolated group of islands in Lake Vänern. National interest for outdoor recreation mainly strives to secure protection of attractive and relatively untouched areas for swimming, boating, angling, canoeing, cycling, etc.
- *Göta Canal – Tiveden (41 030 ha):* One of Sweden's best known constructions; of great importance for outdoor recreation in the area, mainly boating and cycling.
- *Mount Kinnekulle (8 151 ha):* An area of natural beauty with a distinct cultural landscape including a number of manor house environments. The landscape is magnificent and includes a great number of interesting natural and cultural environments, and a varied terrain for roaming.
- *Kållandsö - Hindens rev – Svalnäs (20 912 ha):* This is an area of natural beauty with a varied landscape including archipelagos, farmland and manor house environments. The archipelago is undisturbed with a varied countryside and interesting natural and cultural environments. The area offers good conditions for boating and canoeing. Opportunities for bathing at one of the finest beaches on Lake Vänern, outdoor recreational facilities, and camping make this a well-frequented area both by local residents and visitors from further away.

Chapter 4 in the Swedish Environmental Code designates areas of national interest in view of the natural and cultural assets that exist there. The entire Lake Vänern and its islands and shores are designated as an area of *national interest for tourism and outdoor recreation*. This means that development projects or other environmental interventions may only be undertaken where they can be implemented in a manner that does not significantly damage the natural and cultural assets of the area. Taken together, these areas of national interest possess a great development potential for tourism and day-to-day outdoor recreation. Planning instruments such as *Recreation Opportunity Spectrum* (ROS) and *Limits of Acceptable Change*

(LAC), which combine physical, biological and social use to achieve a long-term sustainable use of the land, may be introduced in the proposed biosphere reserve.

14.1.2. Eco-tourism development for residents and visitors

The proposed biosphere reserve actively supports the development of eco-tourism in the area. Such initiatives lead to improved accessibility to the natural and cultural assets in the landscape, which also benefits people living in the area. The islands and shores of Lake Vänern are of national interest for outdoor recreational exercise and tourism. This means that special consideration shall be given to these interests, in particular outdoor recreational exercise, when assessing the permissibility of different activities. Below are some examples of projects involving the proposed biosphere reserve:

Sustainable travel for soft tourism
Tourism within the proposed biosphere reserve is a major industry with the ambition to expand. The high natural, cultural and recreational assets linked to the attractive lakeside towns and villages offer the right condition for success. It is therefore important that tourism is carried out in a sustainable way. The aim of this project is to gather the stakeholders concerned in order to create a consensus on how travel and tourism in the Lake Vänern and Mount Kinnekulle area can be developed without diminishing or destroying landscape values. The goals of the project are to:

- develop a basis for sustainable infrastructure for soft tourism visiting the landscape assets in the area.
- identify the weak points in order to improve accessibility in the long term, mainly through transport providers.
- present existing and potential opportunities for how to travel between and within the large high-value areas (Mount Kinnekulle, Lake Vänern archipelago and Kålland/Kållandsö) by combining public transport and scheduled boat tours with cycling, walking and canoeing.
- identify entrepreneurs that will develop local boat tours, riding, cycle and canoe hire, etc.
- develop an action plan and strategy together with the stakeholders, with the aim to improve long-term accessibility to the high landscape values, with consideration for assets, countryside and landscape.
- create a network of stakeholders that will continue after the interim project is concluded, with the aim to implement the action plan and strategy.

The project, carried out within the framework of *Regional landscape strategies for the Lake Vänern Archipelago and Mount Kinnekulle* and initiated by the County Administrative Board, resulted in the action plan *Eco-tourism destination 2012*. The plan constitutes a strategy for the development of sustainable travel for soft tourism within the proposed biosphere reserve. The steering group for the biosphere reserve is expected to adopt the plan, which will form the basis for long-term work with tourism development in the area.

Product development for eco-tourism with sustainable travel within the proposed biosphere reserve
The project aims to stimulate the development of soft tourism in the around the Lake Vänern Archipelago and Mount Kinnekulle, and is a cooperation between the candidate area, the Rural Economy and Agricultural Society and local tour operators. The initiative will result in tangible proposals for products, packages and travel based on landscape values and on visitors getting around without using their own car, i.e. by train/bus, walking, cycling, paddling or riding. Within the framework of the project, training will

be offered for local stakeholders and tourism companies in order to create a joint knowledge-base around the landscape values and the opportunities for working in an increasingly sustainable way.

Inventory of hiking trails and cycle routes
The candidate area is carrying out inventories that will form the basis for an expanded network of cycle lanes and a long-distance hiking trail from the north-eastern to the western part of the area. Suitable circular routes will also be proposed, both for cycling and walking. The development of infrastructure in turn leads to increased opportunities for local entrepreneurs to develop their activities, based on the cycling and walking routes. The candidate area is aiming to develop a working method that can also be applied in other areas.

14.1.3 Sustainable development in urban environments

The municipalities in the proposed biosphere reserve work actively with sustainable development. One example is Götene municipality, where an environmental policy with local environmental objectives has been adopted. The policy sets out the municipality's approach to sustainable development and governs all activities. Below are further examples of municipal projects and initiatives based on sustainable development:

- *Environmental investments, Climate Investment Programmes (KLIMP) and Local Investment Programmes (LIP):* KLIMP and LIP provide government grants to municipalities and other local stakeholders for long-term environmental investments. During 2000-2008, the municipalities have carried out a number of projects aided by these grants. The projects have included measures aimed at biogas production, district heating, training in energy-saving, and environmental information to citizens.
- *Energy advice:* The municipalities have employed energy advisors to help citizens with advice and information on energy-saving.
- *Sustainable development in compulsory schools:* Green Flag is an environmental award adapted to schools and pre-schools**.** The Green Flag is visible proof that a school actively prioritises environmental aspects in day-to-day activities and works towards sustainable development. Green Flag is a Swedish branch of the international environmental award, managed by the Foundation for Environmental Education (FEE). There are 25 Green Flag schools within the proposed biosphere reserve.
- *Environmental management systems*: Environmental management system is a tool and aid used to structure and systematise environmental work within an organisation. Lidköping municipality uses this tool in its municipal activities to chart and reduce environmental impacts.
- *Local environmental objectives*: The municipalities work actively to define the national environmental quality objectives at local level.
- *Infrastructure:* Västtrafik, Lidköping municipality and Västra Götaland Region cooperate in the EU project SustAccess to find the best possible design for Lidköping's Resecentrum (travel centre). SustAccess stands for "Sustainable Accessibility" and the project aims to support and increase environmentally-friendly transport. The aim is to make the travel centre accessible, attractive and functional in order to contribute to increased travel with sustainable modes of transport.
- *Ensuring species survival:* Mariestad municipality is working actively to improve the conditions

for the population of the river Tidan brown trout (*Salmo trutta lacustris)* and the threatened fish species asp *(Aspius aspius)*. This prohibits any further exploitation for hydropower of the remaining rapids and stretches of fast-flowing water within the catchment area of the river Tidan. Measures are also taken to secure the migration of fish.

- Creating a *Sustainable Lidköping* is a main process at Lidköping municipality. The process, which will permeate all activities, includes three dimensions – environmental, social and economic. The dimensions are inter-dependent, work together, and reinforce each other. The environmental dimension, i.e. the natural limits for resource use and environmental impact, constitutes the non-negotiable framework for human activity. The social dimension, or participation, constitutes a basic prerequisite for changes towards sustainable development being made in a democratic way and through voluntary undertakings. The economic dimension can be seen as a system that determines the cost of resource use. To sustain a fair use of resources within the framework of the supporting capacity of ecosystems, the price should reflect the limit of sustainable resource use. The crucial foundation stone for sustainable municipal development is a balanced age mix in the population. Priorities include schools, pre-schools, physical planning and increased citizen participation.

Sustainable community planning
Municipalities have the overall responsibility for community and town planning. They should also be able to offer their citizens attractive living and working environments. Economic growth and peoples' well-being depend on the future ecology. The Brundtland Report (1987) can thus form the basis for sustainable community planning, while the national environmental quality objectives, such as A Good Built Environment, provide support when theory is transformed into action. In sustainable community planning, it is important that local stakeholders are engaged at an early stage and that work is carried out across different sectors.
Sustainable planning is an integrated ecosystem approach to physical and land-use planning and management of resources such as land and water. In the proposed biosphere reserve, sustainable community planning could mean locating new developments as to minimise travel distances, developing public transport, extending pedestrian and cycle zones, highlighting water issues, putting more focus on green structures, and strengthening cultural heritage and aesthetical values. Such issues can be coherently described in municipal outline plans. Of primary importance for the proposed biosphere reserve is that municipal officers receive competence development in sustainable community planning and that a network is created between the three municipalities to inspire confidence and the exchange of experience.

14.1.4 Sustainable use of Lake Vänern – A gigantic drinking water reservoir

The proposed biosphere reserve is located within the catchment area of Lake Vänern. It is therefore vital to contribute to the work carried out by the Lake Vänern Society for Water Conservation aimed at improving the environmental status of the lake and contributing to increased knowledge of and understanding for Sweden's largest lake.

Lake Vänern water management plan
The water management plan is a living document that contributes to the conservation of water and nature in Lake Vänern. It consists of four different documents (*Goals and measures for Lake Vänern, The health of Lake Vänern, Lake Vänern and man, Animals and plants in Lake Vänern*) that together describe the

properties, water quality, pollution and recreational values of Lake Vänern, as well as human impacts on the lake. The plan contains goals and measures that form the basis for future research and evaluations. The goals and measures included in the water management plan are in agreement with the type of activities carried out in the proposed biosphere reserve.

Water council
Lake Vänern Society for Water Conservation is a so called water council for the lake. The aim of the water council is to encourage local commitment and participation within the water area. Such local support should lead to better decisions and facilitate measures required to meet the EU Water Directive requirements and to achieve the goal: *By 2015 most waters should have achieved good ecological status*. The water council encompasses Lake Vänern and its archipelagos and shores.

Water and society
During spring 2007, the Centre of Higher Education in Vänersborg carried out a preliminary study on the future requirements of knowledge on Water and Society. Water and Society was here defined as knowledge on the interaction of water with society and nature. In order to meet future requirements of skilled personnel within this area, work is underway to develop an education that runs from upper secondary school through to higher education. During the process, new research facilities will be developed, and national and international exchange on research, development and training will be set up.

The project includes five municipalities: Lysekil, Åmål, Vänersborg, Lidköping and Mariestad. Other participants are the University College of West, the University of Gothenburg, the Västra Götaland Region and the County Administrative Board of Västra Götaland. The work is led by the Centre of Higher Education in Vänersborg.

14.1.5 Landscape in focus

During the candidacy, a working method has been developed based on local commitment. The proposed biosphere reserve provides a neutral arena, or forum, where different stakeholders have the opportunity to meet. Creating a consensus among stakeholders whilst retaining a comprehensive view of the landscape during the course of the work has proven a successful strategy which will be developed further in the proposed biosphere as well as being a model for other areas. Landscape laboratories could be one tool in sustainable development. Here follow examples of projects where this method has been used.

Regional landscape strategies
The County Administrative Board in Västra Götaland carried out a pilot project in the Lake Vänern Archipelago and Mount Kinnekulle area during 2006-2007. The aim was to develop a regional landscape strategy for the area in order to have a comprehensive view for planning and land use purposes. This will lead to the conservation and development of valuable areas, as land-based industries are run in a sustainable way. The pilot project comprised three sub-projects and was commissioned by the government.

> The sub-project *Kållandsö – a rich and flourishing landscape* was based on the question: ”How can we combine long-term conservation, use and development and achieve a common overall view?” The project focused on a limited geographical area where local citizens, relevant authorities and the municipality were engaged in a cooperation process to protect and

develop a rich and flourishing Kållandsö. During the project it was made clear how use, conservation and development can benefit from each other. Rural enterprises working towards sustainable economic and social development were supported. The project resulted in basic documentation for an in-depth outline plan for Kållandsö, increased awareness about landscape values and a better understanding of other interests.

The sub-project *Nature and people in the Lake Vänern archipelago* aimed to develop documentation on how to achieve the national environmental quality objectives ”A Rich Diversity of Plant and Animal Life” and ”Flourishing Lakes and Streams” by conserving and improving the natural values in the area when planning for long-term sustainable outdoor recreation. The project dealt with the question ”How can natural values in the Lake Vänern archipelago be conserved and improved whilst enabling outdoor recreation that is sustainable in the long term?” The sub-project included the inventory of bird skerries in need of clearance, noise measurements, and proposed measures. The project resulted in the following reports:

- Proposed measures for some sandy beaches and wet meadows
- Noise measurements in the Lake Vänern archipelago
- Maintenance of bird skerries
- How to reach Lake Vänern
- Lake Vänern’s shores and bays – encroachment and measures
- Drive more slowly and preserve the silence on Lake Vänern

The sub-project *Sustainable travel for soft tourism* was based on the question: ”How can we make attractive natural and cultural assets accessible by improved infrastructure without reducing their value?” and formed the basis for further development of the Lake Vänern Archipelago and Mount Kinnekulle area as a destination enabling tourists to experience the landscape values and at the same contribute to reduced clime impact. (The project is described under 14.1.2.)

Meat from natural pastures – development of local products

In the old agrarian society, cultivation alternated with grazing and haymaking which provided food for the animals. Up until around a hundred years ago, there were large continuous pastures where animals grazed from early spring to late autumn. Natural pastures are one of the most species-rich biotopes in Sweden and of great importance for biodiversity in the agricultural landscape. The impact on the soil by the grazing animals is a prerequisite for keeping the diversity of species and also favours less competitive plants and animal species. Only a small percentage of traditionally managed meadows and pastures remain.

Within the framework of the feasibility study for the biosphere reserve (2005-2006) interest was investigated among local meat producers for launching a joint brand of meat from natural pastures. The sub-project was called "the Meat Club" and provided a common forum for discussions and opportunities to share experience from other similar projects in the country. Two of the meat producers decided to go ahead! By cooperating with the already established concept *Green farms*, they launched a local product in 2006, which is associated both with excellent quality and nature conservation. Natural pasture raised meat is sold in selected food stores within the proposed biosphere reserve.

Forest sector advisory council

The proposed biosphere reserve is represented in the Skaraborg sector advisory council, set up on the initiative of the Swedish Forest Agency in 2007. The advisory council is inter-sectorial, with representatives from a range of stakeholders. The advisory council provides a forum for the discussion of operative issues, contributes to the adaptation of the regional quantitative forest targets to local level, and provides an opportunity to discuss other current issues.

14.1.6 New innovative opportunities

Energy
The proposed biosphere reserve includes a number of good examples of how society strives for better energy-efficiency. The first *Passive house* in the area, a private dwelling, was built in 2006-2007. Passive houses use a building technology with focus on minimising heat loss, efficient ventilation, and making use of heat generated by people, electrical appliances and solar radiation. Within the area there are also farms with their own biogas plant, where manure is converted to biogas through anaerobic digestion. Götene, Lidköping and Mariestad municipalities have their own district heating plants, where waste is converted to energy as a competitive alternative to heating with oil or electricity.

Technological development & environmentally-driven business development
The development of environmentally adapted products and technologies forms a large part of the adaptation to a sustainable society. Since the proposed biosphere reserve aims to attract research to the region, this can also be used to link up with technological developments at local businesses. For example, through projects where the biosphere office, which gathers a wide range of stakeholders, could offer support or act as a catalyst. Examples of suitable areas for development include technological products from crops, renewable energy and fuels, and recycling of materials.

Miljöpunkten
Since 2004, Miljöpunkten Skaraborg provides a network for businesses that want to promote their environmental products and services. Members comprise entrepreneurs, municipalities and universities that cooperate to stimulate environment driven business development in the county of Skaraborg. Miljöpunkten is a cooperative governed by the needs of the members. Miljöpunkten helps its members with marketing activities, contacts and training, and arranges breakfast meetings, lectures, seminars and other projects demanded by the members.

14.1.7 National, regional and local environmental quality objectives support sustainable development in the proposed biosphere reserve

In April 1999, the Swedish Parliament decided on a new structure for working with environmental objectives and adopted 15 national environmental quality objectives. The objectives describe what quality and state of Sweden’s environmental, natural and cultural resources are sustainable in the long term.

The environmental quality objectives are designed to:

- Promote human health.
- Safeguard biodiversity and the natural environment.
- Preserve the cultural environment and cultural heritage
- Maintain long-term ecosystem productivity

- Ensure wise management of natural resources.

The overall goal is that, within one generation, the major environmental problems currently facing us will have been solved. This means that all the key measures required to achieve the objectives in Sweden need to be implemented by the year 2020 (2050 in the case of the climate objective). However, it takes time for nature to recover, and in some cases the desired quality of the environment will not be brought about on the timescale envisaged, even if vigorous action is taken.
Technological developments may help solve some of the problems, but more far-reaching changes in society are also needed. To achieve the ”one generation” goal, a wholehearted commitment is required on the part of a wide range of bodies and organisations, both in Sweden and abroad. A 16th objective was added by Parliament in 2005, *”A Rich Diversity of Plant and Animal Life”*.

The following are Sweden’s national environmental quality objectives:

Reduced Climate Impact: The UN Framework Convention on Climate Change provides for the stabilisation of concentrations of greenhouse gases in the atmosphere at levels which ensure that human activities do not have a harmful impact on the climate system. This goal must be achieved in such a way and at such a pace that biological diversity is preserved, food production is assured and other goals of sustainable development are not jeopardised. Sweden, together with other countries, must assume responsibility for achieving this global objective.

Clean Air: The air must be clean enough not to represent a risk to human health or to animals, plants or cultural assets.

Natural Acidification Only: The acidifying effects of deposition and land use must not exceed the limits that can be tolerated by soil and water. In addition, deposition of acidifying substances must not increase the rate of corrosion of technical materials or cultural artefacts and buildings.

A Non-Toxic Environment: The environment must be free from man-made or extracted compounds and metals that represent a threat to human health or biological diversity.

A Protective Ozone Layer: The ozone layer must be replenished so as to provide long-term protection against harmful UV radiation.

A Safe Radiation Environment: Human health and biological diversity must be protected against the harmful effects of radiation in the external environment.

Zero Eutrophication: Nutrient levels in soil and water must not be such that they adversely affect human health, the conditions for biological diversity or the possibility of varied use of land and water.

Flourishing Lakes and Streams: Lakes and watercourses must be ecologically sustainable and their variety of habitats must be preserved. Natural productive capacity, biological diversity, cultural heritage assets and the ecological and water-conserving function of the landscape must be preserved, at the same time as recreational assets are safeguarded.

Good-Quality Groundwater: Groundwater must provide a safe and sustainable supply of drinking water and contribute to viable habitats for flora and fauna in lakes and watercourses.

A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos: The North Sea and the Baltic Sea must have a sustainable productive capacity, and biological diversity must be preserved. Coasts and archipelagos must be characterised by a high degree of biological diversity and a wealth of recreational, natural and cultural assets. Industry, recreation and other utilisation of the seas, coasts and

archipelagos must be compatible with the promotion of sustainable development. Particularly valuable areas must be protected against encroachment and other disturbance.

Thriving Wetlands: The ecological and water-conserving function of wetlands in the landscape must be maintained and valuable wetlands preserved for the future.

Sustainable Forests: The value of forests and forest land for biological production must be protected, at the same time as biological diversity and cultural heritage and recreational assets are safeguarded.

A Varied Agricultural Landscape: The value of the farmed landscape and agricultural land for biological production and food production must be protected, at the same time as biological diversity and cultural heritage assets are preserved and strengthened.

A Magnificent Mountain Landscape: The pristine character of the mountain environment must be largely preserved, in terms of biological diversity, recreational value, and natural and cultural assets. Activities in mountain areas must respect these values and assets, with a view to promoting sustainable development. Particularly valuable areas must be protected from encroachment and other disturbance.

A Good Built Environment: Cities, towns and other built-up areas must provide a good, healthy living environment and contribute to a good regional and global environment. Natural and cultural assets must be protected and developed. Buildings and amenities must be located and designed in accordance with sound environmental principles and in such a way as to promote sustainable management of land, water and other resources.

A Rich Diversity of Plant and Animal Life: Biological diversity must be preserved and used sustainably for the benefit of present and future generations. Species habitats and ecosystems and their functions and processes must be safeguarded. Species must be able to survive in long-term viable populations with sufficient genetic variation. Finally, people must have access to a good natural and cultural environment rich in biological diversity, as a basis for health, quality of life and well-being.

The national environmental quality objectives have been made concrete and adapted to regional level. The County Administrative Boards have the overreaching role as regional coordinators of work towards the environmental objectives. They can also offer basic documentation and support to municipalities in their work to develop local environmental objectives and action plans. Municipalities have the responsibility for physical planning of land, water and built-up environments, and can adapt the national and regional environmental objectives to local conditions to guide their own organisation and local policy for sustainable development.

The proposed biosphere reserve is affected by all the national environmental quality objectives with the exception of *A Magnificent Mountain Landscape.*

14.2. If tourism is a major activity:

- **How many visitors come to the proposed biosphere reserve each year?**

The Lake Vänern Archipelago and Mount Kinnekulle is a large geographical area and includes major through routes. Counting visitors is a delicate task due to the large flow of people in the area, especially in the development area. The question is how many people stop for just a “visit”, one-day-visits or stay for more than one day. In 2005, Götene, Lidköping and Mariestad counted 69,000 overnight stays, but this

figure does not reflect the large number of day visitors to the area. The area includes some major tourist destinations that attract a large number of visitors every year from Sweden and abroad: Läckö Castle, Mount Kinnekulle and Göta Canal.

Läckö Castle, situated on a spit of land in the Eken archipelago in Lake Vänern, has a 700-year-old history. The castle is one Western Sweden's most popular tourist attractions. According to a survey carried out by the County Administrative Board of Västra Götaland (1997), three times as many people visit the area around Läckö Castle as those buying entrance tickets. The castle, which has around 120,000 paying visitors per year, is therefore estimated to attract some 300,000 visitors annually to the surrounding areas.

Mount Kinnekulle – the flowering mountain. The very best time of year to visit Mount Kinnekulle is during the spring blossoms, from mid-May to mid-June. A large number of people bring picnic baskets and come to experience the countryside and cultural environment on Mount Kinnekulle. An increasing number of people walk the Pilgrim Route between Husaby and Forshem, or the Mount Kinnekulle mountain trail. In autumn and spring, activities are organised by local entrepreneurs, attracting many visitors. It is difficult to estimate the number of visitors to Mount Kinnekulle, as no comprehensive surveys have been carried out. Point data has been collected on a number of occasions showing, for example, that Falkängen arts and crafts village in Hällekis has around 100,000 visitors annually. A total of 282,759 people visited attractions on Mount Kinnekulle (churches, museums, observation towers, etc.) in 2006.

Göta Canal is one of Sweden's biggest "experience" attractions, with more than 3 million visitors per year. Visitors come from both Sweden and abroad. Around 5,000 pleasure boats pass through the canal every summer. The total length of the canal is 190.5 km, of which 87 km are dug, but only Sjötorp, where the canal starts, is included in the proposed biosphere reserve. Sjötorp visitors' centre had between 40,000 – 50,000 visitors during the summer season (June, July, August) in 2007. Of these, 5,000 rented bicycles or booked cycle packages. It has also been estimated that around 50,000 cyclists a year start from Sjötorp and cycle along Göta Canal, which means that many people use their own bicycles. It has also been estimated that around 200,000 people visit the Göta Canal area in Sjötorp, of which 30,000 arrive in passenger boats travelling on the canal.

There are around 12,000 registered pleasure boats on Lake Vänern and favourite destinations include Djurö - the lake's only national park, Mariestad archipelago, and the Kålland and Eken archipelagos. The guest harbours in the proposed biosphere reserve had a total of 5,900 overnight stays in 2007. According to the boating life survey "Facts about Boating Life 2007" statistic calculations are based on an average of three people per overnighting boat, which would give a total of 17,700 people staying in the guest harbours.

- **Is there a trend towards increasing numbers of visitors? (Give some figures if possible)**

There are trends towards an increasing number of visitors within the proposed biosphere reserve. Foreign visitors in particular are increasing in number, giving nature and culture as reasons for their visit. This is most evident on Mount Kinnekulle, on the island of Kållandsö and around Göta Canal. The reason for the increase is believed to be low-cost airlines and other low-cost communications, which enable people to travel further afield.

Improved accessibility and marketing undoubtedly result in increased numbers of visitors. There is a great

demand for better accessibility to the archipelago areas through increased boat traffic. Such traffic has to be scheduled to certain times and days, and it is estimated that it takes three seasons for new timetables to become well-known among the population. There are no such long-term initiatives outside the western part of the proposed biosphere reserve today.

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

Within the proposed biosphere reserve different types of tourist activities take place all year round. Many different types of tourism are located around Lake Vänern. Cold winters, when the lake is frozen, offer opportunities for long-distance skating. Sailing, canoeing and fishing/angling are other popular activities. A number of camping areas are located within the area. Solitary walks, but also guided tours, focused on flora, fauna and cultural heritage take place. Cycle tourism and tourist-based horse riding occurs, but the last-mentioned in only a few places. Small skiing facilities are found on Mount Kinnekulle.

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

The area has a long tradition of tourism. The observation tower on Mount Kinnekulle, built in the late 19th century, is believed to be the oldest tourist attraction in the area. The area is renowned for its rich opportunities for outdoor recreation and its unique flora and cultural heritage, attracting visitors from all over Sweden and parts of Europe.

During 2008, the prerequisites for developing outdoor recreation and sustainable tourism in the archipelago are being investigated. This is done in connection with the planning and construction of a completely new visitors' centre at Läckö, naturum Vänern Archipelago, which will be completed in the summer of 2010. The overall purpose of a visitors' centre (naturum) is to encourage people to enjoy the countryside. It is therefore important to have easy access to the archipelago and to interesting destinations in the immediate surroundings. The areas in the study include the island of Kållandsö and its archipelagos down to Hindens rev. These areas a largely included in one of the core areas of the proposed biosphere reserve. Once open, naturum Vänern Archipelago will serve as a significant information portal for the biosphere reserve, and an important gateway to one of the core areas in the reserve.

Several new walking trails have recently been created on Mount Kinnekulle in connection with the LIFE project *Kinnekulle Plateau Mountain – Restoration and Conservation*. The trails form a 45 km hiking trail, with a great number of short circular routes. The trails pass largely through nature reserves. Along the trail are four wind shelters and a number of resting areas with tables and benches. A new map has been published, including information on the countryside and history of Mount Kinnekulle and regulations in the nature reserves.

The core areas include facilities for outdoor recreation such as wind shelters, camping areas, fire places, jetties, and hiking trails, which are laid with planks over some wet and swampy areas. Some of the bird-rich core areas have bird towers.

The above-mentioned tourist facilities are also found in the buffer zones. The buffer zones, however, also include other types of facilities such as harbours of varying sizes with boat launching ramps. Adjacent to some of the harbours are fishing villages, boat tour operators, cycle and kayak hire, etc. Popular tourist destinations with manned tourist information centres, info-points, are located in the area. In the buffer

zones you also find lookouts and observation towers, a number of camping areas and youth hostels, outdoor exhibitions, an arts and crafts village and a small ski facility. Sjötorp has an area of locks and a canal system, Göta Canal. The buffer zones also include two museums: Lake Vänern Museum and Vadsbo Museum, as well as a planned new visitors' centre, naturum.

The development area includes some of the facilities above, as well as other attractions such as Medieval World, which aims to make history more accessible by building bridges between fact and fiction, disseminate knowledge and combine adventure and experience. Torsö, the largest island in Lake Vänern, has a rural community centre with rented cottages and a camping area well suited for tourists, passing visitors, school classes, etc. Within the development area there are also farm shops that sell local produce, hotels, tourist offices, youth hostels and a spa.

	Core area	Buffer zone	Development area
Bird tower	X	X	X
Observation tower/lookout		X	X
Harbour		X	X
Jetty	X	X	X
Launching ramp		X	X
Kayak/canoe hire	X	X	X
Boat tours		X	X
Cycle hire		X	
Ski slope		X	
Farm shop			X
Museum			X
Outdoor exhibition		X	
Info-points		X	
Tourist office			X
Hotel			X
Conference centre		X	X
Camping		X	X
Wind shelter	X	X	
Locks and canal		X	
Youth hostel		X	X
Trade/shop			X
Beach	X	X	
Swimming pool		X	X
Golf course		X	X

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

There are a number of positive and negative impacts from tourism on a community and its surrounding landscape. Such impacts can be seen all over the world in areas that have been developed into tourist destinations. An increased influx of visitors is expected to the proposed biosphere reserve, and the Lake

Vänern Archipelago and Mount Kinnekulle area is striving for tourism to contribute to the sustainable development as far as possible. Thus, efforts to produce the action plan *Eco-tourism destination 2012* was a first initiative. It is believed that a great number of local stakeholders within the proposed biosphere reserve will benefit from increased tourism.

Possible positive impacts from tourism:

- Increased employment (seasonal or part-time work).
- Safeguarding natural and cultural assets, as they are the resources in eco-tourism.
- Increased revenue for local entrepreneurs.
- Business developments resulting from increased profits.
- Increased awareness and knowledge about the local area among residents.
- Increased tourism and outdoor recreation in the area will lead to a better understanding of the local environment and local conservation issues.
- The Lake Vänern Archipelago and Mount Kinnekulle area will become better known as an eco-tourism destination (nationally and internationally).
- Increased tourism leads to increased demand for nature conservation.

Possible negative impacts from tourism:

- Increased strain on infrastructure.
- Increased traffic in the area leads to more noise, congestion and increased emissions of greenhouse gases.
- Noise from boat traffic such as water scooters and fast motor boats.
- Longer tourist season leads to increased pressure on the land and shorter recovery periods for ecosystems.
- Too many visitors to sensitive areas in the archipelago may have negative biological impacts.
- Conflicts between different recreational activities may arise.
- Increased tourism leads to increased demand for nature conservation.

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]

There are a number of *tour operators* in the area that arrange different types of trips. One of the operators is working to obtain certification as ”Nature’s best” from the Swedish Tourist Association, allowing it to become an eco-tourism company in the long term. The tour operators are all focused on sustainable tourism.

The area includes a number of *stakeholders* that supply products to local shops (e.g. naturally grazed meat), or who sell local products on site (e.g. wool products, cheese, vegetables). There are also restaurants within the area which serve local produce and who use this in their marketing.

Art and handicrafts are presented every year at Falkängen arts and crafts village, and at the so called ”Vårrundan” that takes place on Mount Kinnekulle during the first weekend in May every year. During the arts weekend you can visit some 80 different activities on Mount Kinnekulle, including everything from smithies to cooking.

Other activities in the area include riding tours, cafés, hire of equipment, etc.

The proposed biosphere reserve has a number of trained *biosphere ambassadors*, whose main task is to spread knowledge about the biosphere reserve and about UNESCO's model for biosphere reserves. The ambassadors carry out different activities in the area and also serve as tourist offices for visitors. The candidate area promotes the ambassadors and their work as good examples.

The Mount Kinnekulle Bus, is an idea that originated locally. The idea is to provide frequent journeys and allow people to get on and off as the bus passes places of interests along the mountain. Guides on the bus and/or at the places of interests, and using the bus as alternative transport for local people are other ideas that have been presented. The idea of the Mount Kinnekulle Bus is important to encourage more people to participate in the work to reduce negative environmental impact, reduce car travel and increase accessibility to the mountain, rich in natural values and entrepreneurship, without damaging the natural assets and the environment.

15. LOGISTIC SUPPORT FUNCTION

15.1. Research and monitoring

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.).

The core areas in the proposed biosphere reserve are included in monitoring or supervision programmes that apply for e.g. nature reserves. These areas are protected under Swedish legislation and have management and conservation plans. Supervision is carried out and suitable measures are taken as required in order to protect the natural values. To ensure long-term effects, it is of great importance that the biosphere office and relevant authorities continue to have a dialogue around the management of landscape values, and that local forces are engaged in the management.

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.]

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

Research:

None

Environmental monitoring:

Ongoing efforts as described below (chapter 15.1.3) have been carried out during relatively long periods and include long time series of measurements.

- The Air Pollution Prevention Association in the South West of Sweden (Luft i Väst), makes

weather and pollution dispersion models
- Monitoring of bottom sediments in Lake Vänern
- National inventory of lakes and watercourses
- Environmental monitoring by the water conservation societies for the river Tidan and the rivers Lidan & Nossan
- Environmental monitoring by the Lake Vänern Society for Water Conservation
- Water chemistry monitoring in Lake Vänern
- Monitoring of groundwater sources
- Monitoring of air and precipitation chemistry
- Urban air quality network
- Bathing water quality

In addition, other monitoring has been carried out within the entire proposed biosphere reserve, or on test plots:
- Heavy metal deposition in Sweden measured in moss, 1975-2005

• Biotic research and monitoring [flora, fauna]:

Research:

Grassland Plant Diversity in Relation to Historical and Current Land Use
The thesis is an interdisciplinary study of grassland plant diversity in relation to historical and current land use. Large-scale cadastral maps showing land use in great detail were used to analyse 18th and 19th century land use, whereas modern conditions were analysed in the field and using contemporary maps. The main part of the field studies was conducted in the former jurisdictional district of Kålland, but comparisons were made with areas in Uppland. Historical management practices of individual grasslands and the content of semi-natural grasslands in the historic landscape showed to be of great significance for current diversity patterns. The wide range of components in historical management better met the varied requirements for grassland plant reproduction than current management under the EU rules for environmental subsidies. These findings open for discussions about grassland diversity as a biocultural heritage, which in turn can lead to new perspectives on the management of semi-natural grasslands. Doctoral dissertation nr 2007:6, Dept of Ecology, SLU, Uppsala, Eva Gustavsson, Lake Vänern Museum, Lidköping.

Grazing behaviour and conservation of cattle – effects of breed and social environment
A Nordic cooperation project aimed at comparing old Nordic breeds with modern breeds of cattle to establish whether the old breeds are better conservationists in natural pastures. Contact: Anna Hessle. The study is carried out at Götala research station in Skara, Swedish University of Agricultural Sciences (SLU).

Fatty acid composition in beef from grazing with and without final feeding
Contact: Anna Hessle. The study is carried out at Götala research station in Skara, Swedish University of Agricultural Sciences (SLU).

Analyses of the effects of great cormorant predation on fish populations and fishery

Point analyses carried out until 2004. Contact: Mikael Johansson, The Institute of Freshwater Research in Örebro, Swedish Board of Fisheries.

Master thesis and student reports:

How affected by human activity are the river mouths in Lake Vänern and how much of the natural values remain? A study of two agricultural rivers along the southern shore of Lake Vänern
The aim is to study how affected some of the river mouths in Lake Vänern are by constructions, changed bottom and shoreline structure, sea walls and infilling. Population centres are located at almost all river mouths. By comparing the appearance of today's river mouths with old maps and aerial photographs, the percentage of affected versus natural seasonally inundated grasslands and bottom areas can be estimated. The studied watercourses are the rivers Tidan and Friaån. Honour Thesis 20 credits, D-level Sara Peilot, School of Life Sciences, University of Skövde. Supervisor: Tomas Jonsson, assistant supervisor: Agneta Christensen, Lake Vänern Society for Water Conservation and Jonas Andersson, County Administrative Board of Västra Götaland. 2006.

Nestedness of flora in limestone pavement nature reserves on Mount Kinnekulle
Species assemblage on the limestone pavements (alvar) on Mount Kinnekulle is a result of geology (large limestone areas) and history (long tradition of management by grazing). These factors have resulted in a unique flora with species such as, *Arenaria gothica*. Today, some parts of the limestone pavements are protected as nature reserves whereas others await restoration. The relationship between areas was studied by looking at seven different alvar sites, using the model for nestedness. Project 5 credits. Ingrid Bertilsson, School of Life Sciences, University of Skövde. Supervisor: Annie Jonsson, assistant supervisor: Johanna MacTaggart. 2006.

The current state and changes of the forest in the Lindberg Nature Reserve plot in Mariestad
The aim of the study is to describe the state of the forest and changes in the Lindberg nature reserve ("Lindbergska ytan"). The area studied consists partly of old, dense coniferous forest, which has been untouched for more than half a century. The coarse pines have reached an age of 150 – 200 years. The oldest spruces are 100 – 150 years old. All trees of more than 6 cm in diameter were callipered. Degree project 10 credits. Mikael Gustavsson, Faculty of Forest Sciences, SLU. Supervisor: Erik Wilhelmsson. 2007.

The effects of commercial fishing and salmon stocking on vendace (*Coregonus albula*) in Lake Vänern; a food web analysis
The thesis provides a theoretical model of a food web in Lake Vänern. The model focuses on the vendace population and is simulated with empirically collected data. Changes in fishing pressure and alternative salmon stocking via regulated smolt releases were variables analysed. Master Thesis in Theoretical Ecology 20 credits, D-level, Johanna MacTaggart, Department of Natural Science, University of Skövde. Supervisor Thomas Jonsson. 2003.

Changes towards an ecosystem-based management of the landscape in proposed biosphere reserves – A study of Kristianstads Vattenrike and Lake Vänern Archipelago and Mount Kinnekulle.
The aim of the study is to describe and analyse factors and strategies that have been important in the transformation towards an ecosystem-based management, and in the creation of a biosphere reserve. The thesis is based on case studies from the Ecomuseum Kristianstads Vattenrike and the nature conservation project "Kinnekulle Plateau Mountain – Restoration and Conservation". Degree project 10 credits. Simon

Jonegård, Department of Mathematics and Natural Sciences, Kristianstad University College. Supervisor: Per Olsson. 2004.

Environmental monitoring:

”Ongoing measures” as described below (chapter 15.1.3) have been carried out during relatively long periods and include long time series measurements. In addition, the following activities have been documented:

- Pasture land flora
- “Flora watchers”
- Catch statistics for fisheries
- Inventory of bird skerries in Lake Vänern
- Quantification of pelagic fish abundance
- Tagging of salmon and brown trout smolt
- Monitoring of bottom fauna in Lake Vänern
- Monitoring of zooplankton in Lake Vänern
- Monitoring of phytoplankton in Lake Vänern
- Forest damage survey by the Swedish National Inventory of Forests
- Swedish bird survey
- Monitoring of environmental pollutants and metals in perch and pike in Lake Vänern
- Green indicators in Lidköping
- State of the environment in Mariestad, Töreboda and Gullspång municipalities
- Environmental reporting in Götene
- Catch statistics for registered sportfishers
- Electric fishing of brown trout in the river Tidan
- Echo-counting of smelt, ruff and vendace
- Measuring of PCBs in salmon and brown trout

In addition, other monitoring has been carried out within the entire proposed biosphere reserve, or on test plots:

- Wetland inventory -1997
- Noise measurements in the Lake Vänern archipelago -2007
- Meadow and pasture inventory 2002-2004
- Inventory of semi-natural grasslands 1986-1991
- Proposed measures for some sandy beaches and seasonally inundated grasslands – Lake Vänern archipelago in Götene, Lidköping and Mariestad municipalities
- Follow-up of protected grasslands - Västra Götaland county 2007
- Dung beetles in Västra Götaland county
- Inventory of freshwater charales 2007
- Inventory of sand lizard (*Lacerta agilis)* in Västra Götaland county 2006-2007
- Management of bird skerries in the Lake Vänern archipelago – management sites and advice for Götene, Lidköping and Mariestad municipalities
- Large blue (*Maculinea arion*) in Västra Götaland county
- Inventory of lady’s slipper (*Cypripedium calceolus*) at Hjälmsäter site, Mount Kinnekulle
- Bird protection areas in Lake Vänern, Västra Götaland county – Draft revision

- Great crested newts (*Triturus cristatus*) in some ponds on Mount Kinnekulle
- Large trees on Mount Kinnekulle – results from tree callipering 2002-2004
- Semi-natural grasslands in Västra Götaland county – what has happened in 15 years?
- Inventory of trees worthy of protection in conservation areas in Västra Götaland county
- Inventory of rich fens in Västra Götaland county 2004
- Inventory of oaks and large deciduous trees in Lunnelid nature reserve
- Harvest mouse *(Micromys minutus)* in Västra Götaland – Population surveys 1985-2002
- Bats in Västra Götaland county, 2001
- Otter – survey during snow-free period in northern Västra Götaland county, 2001. Environmental monitoring report
- Synthesis of inventory of vegetation in restored calcareous grasslands on Mount Kinnekulle, 2004 and 2006
- Synthesis of inventory of red-backed shrike (*Lanius collurio*) in grasslands restored by the Life project on Mount Kinnekulle
- Synthesis of inventory of hermit beetle (*Osmoderma eremita*) on Mount Kinnekulle, 2002 and 2005
- Vegetation surveys on Mount Kinnekulle, summer 2004

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

Research:

Archaeological research around the medieval fortress Husaby biskopsborg
Contact: Anders Berglund, Västergötland Museum.

Ethnological documentation of Rörstrand in connection with closure
Contact: Ankie Wahss, Västergötland Museum and Rörstrand Museum

Master thesis and student reports:

Biosphere Reserve Lake Vänern Archipelago and Mount Kinnekulle from a tourism perspective
The project analyses the proposed biosphere reserve from a tourism perspective, using a model for market communication. During the project, questionnaires were sent to the reference groups linked to the feasibility study for the proposed biosphere reserve. A situation analysis and a SWOT analysis were also carried out. The study shows that there is strong local interest for becoming a biosphere reserve, since this would benefit existing activities as well as encourage new enterprises based on resources in the landscape. The study also shows that a biosphere reserve is a further marketing tool of great value to the municipalities. Pernilla Fogestam, Elisabeth Andersson and Anna Kärner, Cultural Tourism studies, Lidköping. Supervisor: Pierre Chocron, assistant supervisor: Johanna MacTaggart. 2006.

Tourism development plan; Biosphere reserve candidate area, Lake Vänern Archipelago and Mount Kinnekulle
Biosphere reserves provide Swedish conservation work with a new tool. Biosphere reserves comprise large areas of landscape with high natural values, where work is carried out to conserve and develop such values. With this tool as a starting point, a tourism development plan can be integrated in the area with

utmost consideration given to the safeguarding of natural values. This is an investigation into Lake Vänern as a resource in destination development through boat trips, fishing tourism, guided nature walks, etc. The plan includes an overview of structure, resources, infrastructure, competitive strategies, target groups and marketing, as well as overall community planning. Ann-Sofie Andersson, Anita Johansson, Helen Gustavsson, Anita Klasson, Hanna Sundblad, Cultural Tourism studies, Lidköping. 2008.

Biosphere reserves as a tourism resource
A development analysis that highlights measures that would benefit the local economy, employment and entrepreneurship, and that in the long term would lead to an increased influx of tourists to the proposed biosphere reserve. Focus is on how to use and develop existing resources and their potential in a sustainable way. The thesis also proposes measures that may be required in the future, and suggests ways of prolonging the tourist season through various programmes. Maria Thiger, Anne Lundgren, Camilla Sandelius. Cultural Tourism studies, Lidköping. Supervisor: Bengt Holmgren. 2004.

Nature conservation and outdoor recreation, the Life project on Mount Kinnekulle from a tourism perspective
The focus and forms of nature conservation have changed over time. Today, there are a number of different protection forms, some with international links. The majority of people in Sweden have a positive attitude towards nature conservation. The outlook on and initiatives for outdoor recreation have also changed over time. The Right to Public Access offers unique opportunities to enjoy the countryside. Outdoor pursuits can, however, have a negative impact on flora and fauna. By planning, knowledge about the visitors, and various steering instruments, the countryside can be protected from such adverse effects. The essay investigates the relationship between nature conservation, people visiting the countryside, recreational opportunities, and as any clashes of interest that may exist. Degree project C 10 credits, Annika Ahlberg. Department of Human and Economic Geography, Gothenburg University. Supervisor Marie Stenseke. 2006.

Further studies and projects that have been carried out in the proposed biosphere reserve:

- Digitalisation of municipal cultural heritage protection areas
- Sustainable travel for tourism in the proposed biosphere reserve Lake Vänern Archipelago and Mount Kinnekulle
- Settlement structure on Mount Kinnekulle – Study circles as a method of assessing and describing cultural heritage assets
- Settlement structure on Kållandsö – Study circles as a method of assessing and describing cultural heritage assets

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

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

Research:

Fossil meteorites on Mount Kinnekulle
Some 95% of all known meteorites in the world have been found on Mount Kinnekulle. They have been found during quarrying of limestone from the Ordovician period at the Thorsberg quarry. The meteorites

originate from the largest documented collision in the asteroid belt, around 480 million years ago. During 10-30 million years after this event, Earth was bombarded with meteorites and large asteroids. This led to a rapid transformation of animal life on Earth. The project concerns fossil meteorites in Orthoceratite limestone on Mount Kinnekulle and has been going on since 1992. A systematic search for meteorites is carried out in collaboration with the Thorsberg quarry at Österplana. The fossils become visible during sawing of limestone in the quarry. Contact: Birger Schmitz, Department of Geology at Lund University and Mario Tassinari.

Remote sensing estimates of freshwater phytoplankton: Parameterisation of optical process between 600-700nm
The optical properties of Lake Vänern are studied in detail with the aim to improve water quality measurements. Contact: Niklas Strömbeck, Evolutionary Biology Centre, Uppsala University.

Environmental monitoring:

Luft i Väst
Luft i Väst is the Air Pollution Prevention Association in the South West of Sweden. They make dispersion models and calculate air pollution in the region. Their work includes calculating pollution from local emissions, modelling change in the region, modelling point source emissions, calculating emissions from accidents in real time, and calculating wind energy from wind turbines. Some of the measuring data is compiled and hosted by IVL, the Swedish Environmental Research Institute.

Monitoring of bottom sediments in Lake Vänern
Samples are taken at 24 stations in Lake Vänern every ten years (latest in 1998), within the framework of the programme for coordinated national environmental monitoring in Lake Vänern. Lake Vänern Society for Water Conservation.

National inventory of lakes and watercourses
The aim of the inventory is to give an overall picture of the state of Swedish water environments. Parameters investigated include acidification, the presence of metals, and eutrophication. National lake inventories have been carried out every five years since the early 1970s. Evaluation and written reports are made after each inventory and the results are stored at the Swedish University of Agricultural Sciences (SLU).

Water conservation societies for the rivers Tidan, Lidan & Nossan and Lake Vänern
The water conservation societies in the investigation area carry our environmental monitoring, which is reported in different contexts and in annual reports. Reporting and evaluations are carried out regularly both at national and regional level. The aim of the environmental monitoring is to follow year-to-year variations and changes over time and to obtain references for the national inventories. Environmental monitoring includes long observation series that started in the second half of the 20th century. A large number of water chemical parameters are analysed and substance transport is calculated. Results from the measurements are stored in a database at the Swedish University of Agricultural Sciences (SLU), some of which are available on their website: www.slu.se.

Water chemistry monitoring in Lake Vänern

Samples are taken from 3-4 levels in the middle of April, May, June, August and October every year at three stations within the framework for the programme for coordinated national environmental monitoring in Lake Vänern. Department of Aquatic Science and Assessment, SLU/Lake Vänern Society for Water Conservation.

Monitoring of groundwater sources
The aim of the programme is to follow how the chemistry in groundwater changes over time at specific sources. Samples have been taken at sources included in the feasibility study's investigation area in April and September every five years since 1998. Data is stored at the County Administrative Board, which is currently digitalising and linking information from the measured sources to a GIS system.

Monitoring of air and precipitation chemistry
The aim of the monitoring of air and precipitation chemistry is to use the resulting data to describe the load of acidifying deposition, both on coniferous forest stands and on open fields. Such loads can be followed over time. The measurements are co-financed by the County Administrative Board, the Swedish Environmental Protection Agency and the EU. A current development of the programme is the calculation of wet and dry deposition. The sampling is carried out by the Swedish Forest Agency and sometimes by the municipality involved, while the County Administrative Board has the administrative function. The Swedish Environmental Research Institute evaluates the results.

• Biotic research and monitoring [flora, fauna]

Research:

Fish, catches and history/Genetic structure and phylogeographical history of freshwater fish species
The research project strives to contribute to a long-term sustainable use of local and regional fish resources by studying the interplay between the evolutionary changes in fish and biodiversity. The interdisciplinary research includes field work, genetic analysis and cultural-historical studies. The project also aims to increase general knowledge about the evolution, genetic structure and migration history of fish in relation to the development and population of Lake Vänern and the region. The research is conducted in cooperation with fisheries in Lake Vänern, Umeå University and the Swedish National Board of Fisheries. The project is made possible by funds from the Royal Physiological Society in Lund – the Nilsson-Ehle Fund and the Magnus Bergvall Foundation. Contact: Marcus Drotz PhD (Biology) at Lake Vänern Museum.

Chinese mitten crab – an alien species in Lake Vänern
The Chinese mitten crab *(Eriocheir sinensis)* originates from China, but has been brought to European waters mainly with ballast water of freight ships. It is now found in large numbers in Germany, for example, where it has significantly affected the native fauna, damaged equipment of local fishermen and undermined shores and dams. In Lake Vänern and Lake Mälaren there has been a sharp increase in the occurrence of the mitten crab in the last years. The Lake Vänern Museum and the Swedish Museum of National History in Stockholm engage the local population in the reporting of findings of the Chinese mitten crab. The findings and sites can be reported on an Internet website which also informs on regulations regarding size and gender. Contacts: Marcus Drotz PhD (Biology) at Lake Vänern Museum, Stefan Lundberg, Swedish Museum of National History, Stockholm.

Environmental monitoring:

Pasture land flora
The main aim of this programme is to monitor the presence of grassland species favoured by traditional management. Monitoring of test plots include the recording of plants that are favoured by traditional management, plants that are not favoured by traditional management and plants that are favoured by nitrogen. Coverage is recorded in clearly outlined test plots. The basic inventory was made in 1996, and a re-inventory was made in 2001. All results are stored at the County Administrative Board as the principal for the project.

Flora watchers
Flora Watchers (Floraväktarna) is a national programme aimed at monitoring the presence of threatened vascular and cryptogamic plants in Sweden. The scheme was set up in 1987 and is currently running in every county. Through regular inventories, the distribution and population trends of threatened species can be recorded. The inventories are made mainly by volunteer botanists and nature conservationists and are reported to the Swedish Species Information Centre at the Swedish University of Agricultural Sciences (SLU). The publication of annual reports is funded by the County Administrative Board. The World Wide Fund for nature is the principal for the programme.

Catch statistics for fisheries
Compiled annually. Contact: Per Nyberg, Institute of Freshwater Research in Örebro, National Board of Fisheries.

Inventory of bird skerries in Lake Vänern
Inventory of seabirds that breed in colonies in Lake Vänern, within the framework of the programme for coordinated national environmental monitoring in Lake Vänern. Coordinator: Thomas Landgren/Lake Vänern Society for Water Conservation, County Administrative Boards in Värmland and Västra Götaland counties.

Quantification of pelagic fish abundance
Annual echo-counting in August. Contact: Per Nyberg, Institute of Freshwater Research in Örebro, National Board of Fisheries.

Tagging of salmon and brown trout smolt
3,000-5,000 of the farmed smolts that are released in Lake Vänern and the river Klarälven are recaptured. Recaptures are reported to the Institute of Freshwater Research at Drottningholm. Contact: Per Nyberg, Institute of Freshwater Research in Örebro, National Board of Fisheries.

Monitoring of bottom sediments in Lake Vänern
Annual samples are taken in mid-August at two stations, within the framework of the programme for coordinated national environmental monitoring in Lake Vänern. Department of Aquatic Science and Assessment, Swedish University of Agricultural Sciences (SLU)/Lake Vänern Society for Water Conservation.

Monitoring of zooplankton in Lake Vänern
Annual samples are taken from depths of 0-10, 10-20, 20-40 meters in mid-June and mid-August at three

stations, within the framework for coordinated national monitoring in Lake Vänern. Department of Aquatic Science and Assessment, Swedish University of Agricultural Sciences (SLU)/Lake Vänern Society for Water Conservation.

Monitoring of phytoplankton in Lake Vänern
Annual pooled samples are taken from depths of 0 to 8 meters in the middle of May, June and August at three stations, within the framework for coordinated national monitoring in Lake Vänern. Department of Aquatic Science and Assessment, Swedish University of Agricultural Sciences (SLU)/Lake Vänern Society for Water Conservation.

Forest damage survey by the Swedish National Inventory of Forests
Annual inventory of permanent observation plots to record trends in defoliation. Environmental monitoring has been carried out since 1984 and strives to give an overall picture of forest vitality. Permanent observation plots are located on the island of Torsö and at Stora Ek in Mariestad municipality. The inventories are part of a European cooperation project to monitor damage to forests (ICP-Forest). Contact: Lars Andersson, Regional Forestry Board, Alingsås.

Swedish bird survey
Monitoring programme for population size changes of Swedish breeding birds. The bird counts are mainly carried out by volunteers, many of them are members of the Swedish Ornithological Society. The project is carried out by the Department of Ecology at Lund University and is part of the Swedish Environmental Protection Agency's national monitoring programme. Annual bird surveys have been carried out at hundreds of different sites in Sweden during the past 30 years. The programme includes three different surveys: Birds surveys using line transect and point counts are carried out during the breeding season and winter bird counts are carried out one or several times every winter. Contact: Åke Lindström, Ekologihuset, Lund University.

Monitoring of environmental pollutants and metals in perch and pike in Lake Vänern
Metals and stable organic substances in Lake Vänern fish is tested annually within the framework for coordinated national environmental monitoring. ÅF-Environmental Research/Lake Vänern Society for Water Conservation.

Green indicators
Compilation of statistics showing the state of the environment in Lidköping municipality. The general state of the environment and the activities of the municipality are included in the data. Green indicators 2004 can be downloaded from the Internet: www.lidkoping.se/agenda21/pdf/Grona_nyckeltal04_1.pdf Contact: Yvonne Träff, Lidköping municipality.

State of the environment in Mariestad, Töreboda and Gullspång municipalities
Analysis of the state of the environment in the municipalities aimed at showing results from local environmental quality surveys. Contact: Håkan Magnusson, Environmental Office, Mariestad municipality.

Environmental reporting
The internal environmental work, indicators, and the state of the environment in Götene municipality, are included in the Environmental Report 2002, Götene municipality. Contact: Environment and planning office Götene municipality.

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

Research:
Landscape, farmers and their actions 1900-2005 – Between agriculture and biodiversity.
The study focuses on the large agricultural changes that took place in the 20th century, when traditional methods were replaced in pace with the introduction of new technology and new machinery. The study links changes in the landscape (agricultural land use) to how discussions on biodiversity have influenced regulations and actions and how farmers put such information into practice. The area around Källstorp manor and Söne Mad are included as one of three study sites in the country. The project runs from 2006 to 2008. Contact: Ulf Jansson and Anders Wästfelt, Department of Human Geography, Stockholm University.

Nature conservation as business idea – communicative strategies for stimulating increased entrepreneurship within agricultural conservation.
The study focuses on different types of advice within the agricultural sector and contributes to increased knowledge about the differences between advice within nature conservation and advice offered for business development. The research project aims to study which communicative strategies contribute and support the development of nature conservation as a business idea within agriculture, and what advice is needed to stimulate growth in this new sector. The project will result in a number of tangible proposals for measures that support positive development in this area. Lake Vänern Archipelago and Mount Kinnekulle and the county of Halland are case studies. Contact: Magnus Ljung, Swedish University of Agricultural Sciences (SLU).

Dynamic growth capital
The project aims to increase knowledge about the importance of social capital for growth and development. Four pilot municipalities are included in the project (Mariestad, Götene, Lidköping and Vårgårda), which is a collaboration between the university and the public sector. The project will run until 30 June 2009, and will investigate how new industries can be developed using social capital, and how links between private enterprise and the voluntary sector can be developed. Contact: Torkel Andersson, Västra Götaland Region.

Aquarius
The research project aims to preserve shipwrecks in sealed aquariums, where the decaying process occurs at a similar rate as in the natural environment. The project is run in collaboration with the Swedish University of Agricultural Sciences (SLU). Contact: Roland Peterson, marine archaeologist, Lake Vänern Museum in Lidköping.

“Block” boats
According to historical sources and oral tradition, timber was transported from the forests in Värmland across Lake Vänern in a unique type of boat called block boat. The Lake Vänern Museum has to date located more than 500 shipwrecks, of which around ten are believed to be block boats. Contact: Roland Peterson, marine archaeologist, Lake Vänern Museum in Lidköping.

Tree-of-Life stones – Antiquarian survey

The aim of the project is to carry out a comprehensive antiquarian documentation of Sweden's tree-of-life stones (also called lily stones) and as far as possible also stone-slabs with processional crosses (stavkorshällar). The project also strives to set out a conservation programme for the stones, involving voluntary organisations, associations, and the public. The project has been made possible by grants from the Royal Swedish Academy of Letters, History and Antiquities, the Diocese of Skara, Grevilli's fund and the County Administrative Board in Västra Götaland. Contact: Annelie Nitenberg and Anna Nyqvist Thorsson, archaeologists at Lake Vänern Museum and PhD students at the Department of Archaeology and Ancient History at Gothenburg University.

River Lidan project
Finds such as stone coffins, shipwrecks, kayak constructions, and stray objects have led to a total inventory of the bottom of the river Lidan, between the town bridges. The results indicate that there was a settlement by the mouth of the river earlier than previously believed. The Lake Vänern Museum is producing an animated version of the bottom of the river to make this material accessible to the public. Contact: Roland Peterson, marine archaeologist, Lake Vänern Museum in Lidköping.

Sunnerby project
Sunnerby is located at Ullersund on Kållandsö. Archaeological excavations have shown that a healthy population lived here around 600-900 AD. The project is a cooperation between the Lake Vänern Museum and the Department of Archaeology and Ancient History at Gothenburg University and is funded by the Harald and Gustav Ekman fund, the Royal Swedish Academy of Letters, History and Antiquities, Per and Helen Dreijer Foundation, Solveig and Axel Lindahl's Foundation for Culture. Contact: Annelie Nitenberg and Anna Nyqvist Thorsson.

Outdoor recreation in change
"Outdoor recreation in change" is a research programme focusing on outdoor recreation and nature tourism. The programme comprises six different projects, involving some 15 researchers from several different universities and colleges. Mount Kinnekulle is studied in the project *Outdoor recreation and nature conservation*. The project aims to generate knowledge about the interaction between outdoor recreation and the conservation of nature. Contact: Marie Stenseke, PhD (Human and Economic Geography), associate professor at Gothenburg University.

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

A number of long-term research projects are carried out in the area, and are expected to continue. A comprehensive synthesis of research in the area enables the identification of knowledge gaps, allowing relevant areas of research to be advertised. The Lake Vänern Archipelago and Mount Kinnekulle area is expected to increasingly attract foreign and national researchers. The biosphere office can also actively participate in stimulating research projects within areas that are of particular interest for the biosphere reserve. Examples include projects that increase public awareness of valuable natural and cultural environments, development of landscape analysis in specific geographical areas, and applied research for technological development. Interest for starting research projects in such areas has already been shown.

Systematic environmental monitoring will continue, and also here are clear benefits of a comprehensive synthesis of projects. Municipalities, regional authorities, and interested local stakeholders will profit by having an overall view of ongoing projects in a wider area.

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

Ongoing long-term research and environmental monitoring will continue:

- Fossil meteorites on Mount Kinnekulle
- Remote sensing estimates of freshwater phytoplankton: Parameterisation of optical process between 600-700nm
- Air quality measurements carried out by Luft i Väst
- Monitoring of bottom sediments in Lake Vänern
- National inventory of lakes and watercourses
- Environmental monitoring by the water conservation societies for the river Tidan and the rivers Lidan & Nossan
- Water chemistry monitoring in Lake Vänern
- Monitoring of groundwater sources
- Monitoring of air and precipitation chemistry, Swedish Forest Agency

•Biotic research and monitoring [flora, fauna]:

Ongoing long-term research and environmental monitoring will continue:

- Fish, catches and history
- Chinese mitten crab – an alien species in Lake Vänern
- Pasture land flora
- Flora watchers
- Catch statistics for fisheries
- Inventory of bird skerries in Lake Vänern
- Quantification of pelagic fish abundance
- Tagging of salmon and brown trout smolt
- Monitoring of bottom fauna in Lake Vänern
- Monitoring of zooplankton in Lake Vänern
- Monitoring of phytoplankton in Lake Vänern
- Forest damage survey by the Swedish National Inventory of Forests
- Swedish bird survey
- Monitoring environmental pollutants and metals in perch and pike in Lake Vänern
- Green indicators in Lidköping
- State of the environment in Mariestad, Töreboda and Gullspång municipalities
- Environmental reporting in Götene
- Monitoring bird deaths
- Traditional management as a base for conserving meadow and pasture plants

•Socio-economic research [demography, economics and traditional knowledge]:

Ongoing long-term research and environmental monitoring will continue:

- Nature conservation as business idea – communicative strategies for stimulating increased

entrepreneurship within agricultural conservation.
- Dynamic growth capital
- Aquarius
- "Block" boats
- Tree-of-life stones – Antiquarian inventory
- River Lidan project
- Sunnerby project
- Outdoor recreation in change

15.1.5. Estimated number of national scientists participating in research within the proposed biosphere reserve on:

• a permanent basis: _____7_____
• an occasional basis: ____10_____

15.1.6.Estimated number of foreign scientists participating in research within the proposed biosphere reserve on:

• a permanent basis: _____1_____
• an occasional basis: _____0_____

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

An estimated three masters and/or doctoral theses are carried out on the proposed biosphere reserve every year.

15.1.8. Research station(s) within the proposed biosphere reserve:

[2] = permanent [0] = temporary

There are two research stations within the proposed biosphere reserve:

Dacapo hantverksskola
Magasingatan 4
542 30 Mariestad
Sweden

Lake Vänern Museum
Framnäsvägen 2
531 54 Lidköping
Sweden

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]

Lanna research station (since 1929), SLU
Saleby
531 96 Lidköping
Sweden
Approx. 20 km south of the proposed biosphere reserve

Götala research station, SLU
532 94 Skara
Sweden
Approx. 15 km south of the biosphere reserve

Västergötland museum
Box 253
532 23 Skara
Sweden
Approx. 15 km south of the biosphere reserve

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]:

Throughfall monitoring network
The first measurements were made in 1985, but the throughfall monitoring network used today was established in 1995. There are more than 100 monitoring sites in Sweden, one of them located within the proposed biosphere reserve. The aim of the network is to describe the current situation, regional differences, trends over time, and the effects of acid deposition. In addition to the deposition measurements, ground chemistry and concentrations in air are sampled and analysed.

Measurements are taken at regular intervals throughout the year, once a month or once a quarter, and an annual average is calculated. Methods and measurements are included in the EU manuals for environmental monitoring.

Sampling sites in Lake Vänern
One of the three sampling sites in Lake Vänern is located within the proposed biosphere reserve.

- *Water chemistry* is tested five times a year and the following parameters are measured: Temperature, conductivity, pH, calcium, magnesium, sodium, potassium, alkalinity, sulphate ions, chloride, ammonium, nitrite-nitrate, total nitrogen, kjeldahl nitrogen, phosphate, total phosphate, total organic carbon (TOC), potassium permanganate, absorbance, oxygen, silicon, chlorophyll,and transparency. Measurements started in 1973.
- Sampling of *phytoplankton* in Lake Vänern is carried out four times a year, since 1979.
- Sampling of *zooplankton* in Lake Vänern is carried out twice a year. Measurements started in 1973.

Sampling sites in watercourses

Two of the 13 sampling sites included in the programme *water chemistry in inflowing watercourses* are located within the proposed biosphere reserve, in the rivers Lidan and Tidan. Measurements started in 1968, and today surface water samples are taken monthly and chemical variables recorded. The aim of the monitoring is to describe changes in the water chemistry in watercourses flowing into Lake Vänern, and to obtain data for calculations of mass balance and substance transport in the Lake Vänern tributaries. Sampling techniques and equipment is described nationally by the Swedish Environmental Protection Agency.

Urban air quality network
A long-term and cost efficient programme for measuring air pollution. The main purpose of the project is to enable municipalities in the country to assess and describe the air quality in urban areas. Measurements are normally carried out in the so called urban background, a central location but without direct influence from local sources. Measurement sites are selected as to obtain mean loads of air pollution in urban areas and to enable comparisons between towns. Measurement site in e.g. Mariestad. The urban air quality network was established in 1986.

Monitoring plants for vegetation change
In connection with the extensive restoration measures carried out within the Life project on Mount Kinnekulle (2002-2008), documentation inventories were carried out in several of the areas concerned. The inventories will form the base for monitoring the development of vegetation after clearances and resumed traditional management practices.

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.]:

A number of local meteorological stations, which form part of a national network of observation sites, are located within the proposed biosphere reserve. The Air Pollution Prevention Association in the South West of Sweden (Luft i Väst) has developed a dispersion model for Västra Götaland county, based on the local terrain and observations from e.g. measuring masts.

The County Administrative Board and the municipalities have developed GIS databases for a range of sectors in society and for nature inventories such as the wetland inventory and the meadow and grazing land inventory. The Swedish Forest Agency has corresponding databases for forests and forest values, such as key biotopes.

Lake Vänern Museum has access to laboratories and field equipment, and a mobile filed station used for educational purposes. There are also practical aids such as vehicles and boats. The museum includes a reference library.

Dacapo hantverksskola has purpose-built laboratories and authentic full-scale environments for studies in building crafts and garden crafts and design. There is a reference library on campus.

Reports of environmental monitoring and nature inventories are also available at the municipalities and the County Administrative Board of Västra Götaland. The water archive at the county administrative board includes environmental monitoring reports dating back to the 1960s and 70s for lake Vänern and the watercourses in the former county of Skaraborg.

15.1.12. Other facilities

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

Dacapo hantverksskola has two overnight rooms for visiting scientists. Alternatively, there is a youth hostel and hotels in Mariestad.

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

Yes, with broadband connection.

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].

Green Flag is an international environmental award especially developed for schools and pre-schools. The Green Flag scheme offers membership in a network of more than a thousand schools and pre-schools in Sweden which all work with environmental issues. A great number of schools (25) within the proposed biosphere reserve have received this award.

Measures have been proposed nationally for a wide-reaching implementation of *education for sustainable development.* Important components include competence development among teachers and teacher training institutions, and increased support to schools. The award *Education for sustainable development* inspires teachers and increases their motivation for and interest in working with sustainable development.

S*chool forests* are marked off at the disposal of schools for lessons and outdoor visits. Here, theory can be tested in practice. The school and the landowner set up an agreement allowing the school to carry out activities beyond the Right of Public Access, e.g. building a fire place, wind shelter and even felling a few trees. There are several school forests within the proposed biosphere reserve.

Biosphere ambassadors, see chapter 14.3, have been trained during 2007.

Landscape management is a vocational programme for people who want to work as landscape managers in the cultural landscape, in near-urban areas and in parks. The three-year programme is available at Gothenburg University, Department for Conservation/Hantverksskolan Dacapo in Mariestad from autumn 2008. The programme includes courses and units focused on “biosphere reserves”.

The Lake Vänern programme is an upper secondary school programme combining subjects from the social science and natural sciences programmes. The programme provides a basis and competence for further studies in these areas.

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

Temporary educational and information activities constantly take place in the proposed biosphere reserve. Courses of varying length are carried out by different units. *Climate smart* and *Energy gain* are projects run by the municipalities, where entrepreneurs and private individuals learn about energy efficiency. *Energy advice* in connection with e.g. building is offered to private individuals by the municipal energy advisors. The *House building school* organised by Götene municipality includes this type of information.

Eco-driving is taught by all driving schools today. Consultants are also invited to companies and

municipalities to train employees. This is a way of saving money and improving the environment. Exhibitions and trade fairs are other ways of spreading information and activities of this kind. The biosphere office has arranged a course in how companies can obtain the certification *Nature's Best.* There are also courses (optional) in FSC certification of forests.

Hållplats Vänern is a mobile field station used by schools for observations in and around Lake Vänern. Pupils have the opportunity to investigate their natural surroundings through imaginative and playful experiments, led by guides from the Lake Vänern Museum in Lidköping.

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]:

Lake Vänern Museum in Lidköping
The Lake Vänern Museum is a visitors' centre with focus on the natural and cultural heritage of Lake Vänern. The museum's vision is to: "Engage a wide public in the interaction that takes place between the natural and cultural values of Lake Vänern, through research and accessibility. The activities are characterised by a long term perspective. The museum strives to be a sought after institution and collaboration partner, both in the world of research and among authorities and organisations working with the natural and cultural heritage of Lake Vänern. The museum will offer a wide range of activities to the public, thereby creating a vital link with the community. The exhibitions should attract visitors to Lidköping from further afield. The museum should be a natural starting point for learning and understanding the natural and cultural history of Lake Vänern." Visitors to the museum include school classes and guided tours can be arranged for groups.

The museum is a good starting point when planning a trip through the proposed biosphere reserve. It is a museum for the large waters of Lake Vänern. Exciting meetings take place between art and science, land and water, and contemporary landscapes and history of mankind. The museum arranges exhibitions, lectures and activities for children and adults that reflect life in, on and by Lake Vänern.

Millstone quarry at Lugnås
The millstone quarry on Mount Lugnåsberget recreates the historic industrial environments surrounding the mine. Currently, a survey is being made of the millstones' distribution.

Fjällalaget, an association for millstone enthusiasts, has since 1991 gathered information and knowledge about the millstone quarrying in the area. The association also carries out on-site experiments, quarrying millstones using old methods and equipment and documenting the process, material and results. The experiments are carried out with permission from the Swedish National Heritage Board.

According to tradition, Lugnås has exported millstones all over Scandinavia and even as far as Turkey, although there is no documentation of this. Another aspect of Fjällalaget's research concerns documenting the use of millstones from Lugnås in Sweden and, secondly, via international contacts, their occurrence in Scandinavia and other European countries. This inventory started in 2003 and the written documentation is expected to be ready in 2008.

Vadsbo museum and Mariestad industrial museum
The museums are located in the Marieholm Residence in Mariestad, and show the history of the area from prehistoric times to the 20th century, and the industrial development of Mariestad during four centuries. Vadsbo museum arranges school visits and separate showings of the exhibitions that include archaeology from the Stone and Bronze Ages, finds from excavations of Iron Age settlements, medieval objects, and

19th century fishing and hunting equipment.

Källstorp estate
On the initiative of the landowner, three walking trails have been prepared (1.6 km, 2.5 km and 5 km) taking walkers through fine forest areas and out to five islands via footbridges, with areas for grilling. The trails were ready in 2006 and were made possible through funds from the County Administrative Board of Västra Götaland.

Naturum Lake Vänern Archipelago
An attractive information centre for the Lake Vänern archipelago is planned to open in July 2010. This naturum will offer visitors highly qualitative information about the archipelagos in Lake Vänern and Djurö national park. Guided tours will attract visitors to the archipelago to experience the natural and cultural values that exist there. Activities will focus on communicating scientific, natural and cultural values. The naturum will include permanent and temporary exhibitions, programmes, film show and lectures.

Kvarnen Science Centre
This innovative and unique science centre is planned to open in the summer of 2010. The vision is to create an attractive meeting place for schools, businesses and researchers contributing to a sustainable development. By profiling on energy themes, which will permeate the entire centre, an overall approach to energy issues can be made offering a deeper understanding of the complex problems that surround our energy use. Kvarnen will appeal to everyone, regardless of age and background. One of Kvarnen's aims is to stimulate children's and youths' inquisitiveness and to influence their attitude to science and technology in a positive way as to encourage more young people to study these subjects in the future.

Västergötland Museum
Västergötland Museum is part of Västarvet (administration for natural and cultural heritage in Västra Götaland Region) and is located approx. 15 km south of the proposed biosphere reserve. The museum has the task of preserving, protecting and bringing to life the cultural heritage for today's and future generations. The museum includes an extensive culture-historical picture archive and unique artefact collections. Lectures, courses and other events are organised for the public. Not far from the main building is an outdoor museum, Fornbyn, which includes some 30 dwellings from different parts of Västergötland. Västergötland Museum also carries out archaeological excavations and building preservation.

Other:
Sjötorp and Norrkvarn have visitors' centres linked to Göta Canal. Mount Kinnekulle includes a number of places of interest with information, signs and walking trails. The municipalities have their own tourist information centres, with information and advice on e.g. countryside cycling and hiking routes. In Mariestad, guided tours are conducted in the "Old Town", a well-preserved area of culture-historical interest. Nature trails, information sites and boards are found in many places, such as Mariestad archipelago, Kållandsö, Mount Kinnekulle and Mount Lugnåsberget.

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]

Gothenburg University, via Dacapo, offers advanced vocational education in the areas of landscape management, building crafts and garden crafts and design. There are also shorter courses in these subjects.

The area receives annual visits from geology students at Södertörn University and Chalmers. Many other universities and colleges visit the area for educational purposes.

Municipal administrations/departments and the County Administrative Board offer work-experience placements.

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.]

Active participation in the world network is highly rewarding for an area that is developing into a fully functioning biosphere reserve. Thus, the Lake Vänern Archipelago and Mount Kinnekulle area has participated in as many international meetings as possible. The proposed biosphere reserve sent delegations to the EuroMAB conferences in 2005 and 2007, and to III World Congress in Madrid in 2008. Representatives from Götene municipality visited the partner area Schorfheide-Chorin in June 2008. A visit from Lower Morava biosphere reserve is planned in late September 2008.

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

The proposed biosphere reserve currently has no collaboration with existing biosphere reserves at national level. However, Lake Vänern Archipelago and Mount Kinnekulle has actively supported the feasibility study for ”Blekinge Archipelago”, offered advice on extended collaboration between municipalities, organisational issues and much more. Blekinge Archipelago became a candidate biosphere reserve in December 2007.

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.]

Partnership with Schorfheide-Chorin

A first initiative towards a partnership between Lake Vänern Archipelago and Mount Kinnekulle and the Schorfheide-Chorin biosphere reserve in Germany was taken in October 2005. Several common areas were identified at an early stage of the partnership, such as education for sustainable development, and sustainable forestry. The initiative has since developed to include more areas of collaboration. Both areas have a similar socio-economic structures and political systems, which benefits and strengthens the partnership. The areas also have analogue physical geographical regions and mutually good accessibility. The following initial collaboration areas have been proposed:

Regional marketing of the biosphere reserve
- Exchange of experience of instruments that have been developed to market local stakeholders, products and services.
- Building networks between local authorities and key stakeholders.
- Marketing strategy based on the biosphere reserve.

Ecotourism
- Directed tourism and waterside infrastructure.
- Considering local characteristics when building new developments.
- Offering ecotourism.
- Offering tourism and education about the landscape to children and young people.

Education for sustainable development
- Local schools are engaged in processes around sustainable development.

Twinning agreement between Götene municipality and Angermünde
The budding collaboration between Schorfheide-Chorin and Lake Vänern Archipelago and Mount Kinnekulle has led Götene municipality to initiate a twinning agreement with Angermünde. The agreement mainly concerns the development of the biosphere reserves in the two areas.

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.]

Lake Vänern Archipelago and Mount Kinnekulle has the potential to collaborate with other biosphere reserves in thematic networks. Suitable themes for the area are e.g. islands and archipelagos, natural grazing, ecotourism, sustainable community planning, and education for sustainable development. The partnership with Schorfheide-Chorin is developing around common themes, see above, where both areas benefit from the exchange of knowledge and experience. In addition, the proposed biosphere reserve has actively supported the development of *Blekinge Archipelago*, an area approved by the Swedish MAB committee as a biosphere candidate area in December 2007. Apart from the obvious (archipelagos), both areas also include three municipalities. It is expected that a deeper collaboration will develop including e.g. municipal planning issues.

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.]

So far, Lake Vänern Archipelago and Mount Kinnekulle has not established collaboration with other biosphere reserves at the international level. Participation at EuroMaB conferences (2005 & 2007) and III World Congress in Madrid (2008) has led to a number of positive dialogues being initiated about possible future cooperation projects.

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]

Uses and activities occurring within the core areas include hay-making, grazing, outdoor recreation, clearance of pastures and forests, hunting, fishing, farming, forestry, reed control, research and environmental monitoring. Some core areas are permitted to develop freely without management, but the land may be used for recreational purposes.

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)

Various adverse effects on the core areas may occur. For example, if forestry is carried out without care, habitats may disappear or become fragmented. Water scooters and boats cause noise and wave disturbances, which if severe may disturb birdlife and ecosystems in the vulnerable archipelago environment. Driving water scooters and boats in shallow areas may lead to turbidity that disturbs fish and small aquatic animals. Unwanted substances from private sewers may have an adverse effect on watercourses. Ditching and clearing may lead to the disappearance of habitats, to substances reaching the recipient faster, or to temporary turbidity. Some areas are frequently visited, which can lead to wear and tear and littering. Nature reserves designated by the County Administrative Board include management plans that regulate the use of the areas and channel visitors. The regulation of Lake Vänern has led to encroachment by reeds and other plants. The introduction of invasive species such as signal crayfish and Chinese mitten crab may alter the natural system. Altered species composition as a result of eutrophication increases the occurrence of e.g. raspberry, nettles, and false oat-grass *(Arrhenatherum elatius)*. A potential lack of grazing animals and active users is another possible adverse effect on the core areas.

See also Commission on Climate and vulnerability, chapter 16.2.2.

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).]

The buffer zones within the proposed biosphere reserve are currently afforded varied forms of protection. Land use and economic activities in the area are carried out in accordance with such legislation. Activities such as the clearance of grazing land and forests, hay-making and reed control are permitted. The buffer zones include both conventional and ecological farming. The recreation, restoration and building of new wetlands and the restoration of spawning grounds and migration routes for fish are carried out with state grants and other funding.

The buffer zones include popular areas for outdoor recreation and include activities such as ecotourism and guided walks. When planning such activities, visitor streams are channelled to protect vulnerable environments. To increase awareness about the Right of Public Access and the different forms of protection that occur in the buffer zones, information signs occur at many of the most popular places of interest. The area is the subject of research and environmental monitoring, as well as sustainable planning. Parts of urban areas are located in the buffer zones. Therefore, activities linked to urban environments also occur, such as trade, transport and building.

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:
Even if the buffer zones are afforded some protection, adverse effects occur in and around the area. Global effects include air and water pollution, and climate change. The introduction of alien species also constitutes a threat as they may invade native species.

Water regulation of Lake Vänern and other watercourses affects large parts of the buffer zone. The regulation of Lake Vänern means reduced water level fluctuations. This leads to problems with encroachment of shores and bird skerries, and lost habitats for birds and insects. Dredging and clearance of bay and watercourses may also have adverse affects.

Adverse effects occur despite consideration shown in agriculture and forestry. Outdoor recreation may cause noise, wear and tear and littering. Furthermore, shortcomings in community planning, with land exploitation and landscape fragmentation, cause significant adverse effects in the area. A potential lack of grazing animals and active users is another possible adverse effect on the buffer zones.

Forestry on Mount Kinnekulle
The forest that grows on Mount Kinnekulle is the result of forestry carried out over the last few centuries. Large areas, mainly on Högkullen, are planted with Norwegian spruce. Large parts of this forest were previously open fields and pastures. The Church of Sweden, Skara diocese, is one of the largest owners of the spruce stands. Clear cutting has been the only dominant forestry practice in the last 50 years. In recent years, and especially after the two storms Gudrun and Per, discussions about alternative forestry methods have gathered momentum. The system built around clear cutting is well established and it may be difficult to change the entire production process. Changing to forestry methods other than clear cutting offers a potential for promoting a diversity of values, mainly ecological, but also cultural and social.

On 12 June 2008, an excursion was organised with representatives from the Church of Sweden, Skara diocese, Götene municipality, the County Administrative Board of Västra Götaland, the Swedish Forest Agency and the Swedish Society for Nature Conservation to discuss forestry and reforestation of clear-cut areas. Another reason for holding the meeting was that the Skara diocese has been criticised for overexploiting the forest. Discussions centred around the size of clear felled areas, the amount of forest in areas bordering on storm-felled areas that should to be felled, damage done by vehicles, and reforestation. The Church was of the opinion that stands bordering on storm-felled forest must be cut to prevent it falling in future storms and that vehicle damage must be repaired. Regarding reforestation, they thought it best to allow the rejuvenation of deciduous trees, and to plant birch, larch and also Norwegian spruce in favourable positions less densely than before. An amendment to the Swedish Forestry Act came into force in July 2005. The first part of section ten now reads: ”Felling on forest land shall be performed in order to promote the establishment of a new stand, or to benefit the development of the existing stand.”. The amendment reads: ”To facilitate experimental activities *or to protect and develop nature conservation*

and/or cultural heritage preservation values the Regional Forestry Board may grant exemptions from the first part of this section."

This can be seen as a natural result of forest policy development. To achieve the environmental quality objective Sustainable Forests and the vision of increasing the diversity of forestry methods, a more flexible formulation of forestry legislation was required. The meeting concluded with an agreement to develop a "forest landscape plan" for Mount Kinnekulle, together with the authorities and landowners. The plan has the aim to create a forest characterised by multiple-use forestry to satisfy all the values of the forest (ecological, economical, social and cultural).

Commission on climate and vulnerability

The Commission on climate and vulnerability talks about Sweden as a country that will be deeply affected by climate change in the future. The scenario describes southern Sweden as having drier summers and wetter winters in the next decades. The percentage of precipitation falling as rain during winters is expected to double during the period up to year 2020 and snow is expected to become increasingly rare along the coasts of southern Sweden. Heavy rainfalls will become more frequent, especially on the west coast of Sweden. As a result of the increased rainfall, around 300,000 buildings in Sweden will be under threat of collapse, and effects of flooding may cost society around SEK100 billion. Water levels in the big lakes will rise, which also brings large costs. According to the report, the building of a tunnel for draining water from Lake Vänern would be more cost-effective than paying for flood damage. The commission also stresses that knowledge about how climate change will affect different sectors of society and which adaptation measures may be required is still relatively limited, and that more research is needed.

Ongoing climate changes risk destroying large areas of built-up and cultivated land, as well as disrupting technical infrastructure in municipalities along the Lake Vänern coast. The municipalities around Lake Vänern therefore have a common interest in taking long term measures to minimise the adverse effects that may threaten their existence and development. A collaboration regarding the water regulation of Lake Vänern has already been initiated. The background to this collaboration is the official government report "Sweden facing climate change - threats and opportunities", described above in general terms. It is important that effects of climate change are considered and integrated in decision making in both the private and public sectors, to make climate adaptation as cost-effective as possible. Many measures can be taken in connection with normal maintenance and new investments. The County Administrative Board can play a central role as support for municipalities and other stakeholders.

The entire Swedish countryside will change, including the proposed biosphere reserve. Possible regulations to lower the water level in Lake Vänern and reduce water level fluctuations will have a direct impact on waterside ecosystems and on flora and fauna in the archipelago. The shores of Lake Vänern and bird skerries will in all probability become overgrown, which will greatly affect e.g. seabirds in Lake Vänern. Forests will also be affected, and within the proposed biosphere reserve the rates of forest growth and forest damage are expected to increase as a result of an increased number of pest insects and storm-felling. The Forest Sector Advisory Council (see chapter 14.1.5) can play a central role for counteracting undesirable adaptation, such as increased used of pesticides and the introduction of tree species that impair biodiversity.

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 as 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):

Economic activities and land use in the transition area are diverse. Farming and forestry are important industries. Relatively large areas are farmed ecologically. One of the largest ecological dairy-cow herds in the county is located i the area. Large food industries are also located here, the largest being Gunnar Dafgård AB, which produces ready-made meals, and Arla dairy products. Linked to the towns in the area are a number of large and small industries, including a pulp mill, plastics industry and mechanical engineering.

The E20 motorway and the national roads 44 and 26 pass through the area. The Kinnekulle railroad takes passengers between Gothenburg and Hallsberg. Boat services in the archipelago areas are frequent, especially during the summer and holiday periods. Currently, there are no regular boat services in the archipelago, but guided boat tours operate in the western parts of the archipelago. It is also possible to book boat trips to Lurö archipelago in the county of Värmland. Recreational facilities and a spa are found at Lundsbrunn. Recent years have seen extensive building in the towns in the area.

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

There are various activities that can have an adverse on the transition area. The establishment of polluting industries, water regulations, and extensive land exploitation are some examples. The trend in agriculture and forestry towards larger holdings leads to new farm layouts and the amalgamation of farmland into larger areas. This in turn leads to further fragmentation of landscapes that are associated with small-scale farming, constituting a threat to biodiversity. The introduction of alien species has various adverse effects. Short-sighted community planning of buildings, infrastructure, areas for recreation, etc., leads to an unsustainable society. Land exploitation for summer houses and permanent housing in waterside locations could have an adverse affect on the transition area, as it may impair the public's access to the coastline.

Growth, if extensive, could have adverse effects, as it could overload municipal infrastructure, water resources, sewage, etc. with large implications for society. Sustainable planning for such population increases could mitigate such adverse effects. Planning tools can be used for sustainable planning to ensure that all sustainability aspects are included in the physical planning. Such a tool is being developed through Lidköping's environmental management system, which will hopefully be used also by other municipalities.

See also *Commission on climate and vulnerability*, chapter 16.2.2.

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)]

Country: Sweden

County: Västra Götaland
Municipalities: Götene, Lidköping and Mariestad

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).

Core areas include national park, nature reserves, Natura 2000 sites and forest habitat protection areas.

The buffer zones consist of areas of national interest for the purpose of nature conservation, areas of national interest for the purpose of culture heritage conservation, Ramsar site, nature conservation areas, forest with nature conservation agreements, fish protection areas and protected shores.

The transition area includes other 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.]

Contiguous. The core areas are mainly surrounded by buffer zones which in turn are surrounded by the transition area.

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

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 zonation principle for the Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve is not contingent on any new legislation. The zonation is based exclusively on the provisions of existing legislation. Core areas are governed by regulations and guidelines under the Natura 2000 legislation, and the regulations for national parks, nature reserves (including municipal reserves) and forest habitat protection areas in accordance with the Swedish Environmental Code, which came into force on 1 January 1999 (SFS 1998:808). Special regulations for the abovementioned protected areas are included in decision statements. Documents that confirm the status of theses areas are found in Appendix 4.

Mount Kinnekulle is an exception, see chapter 7.4.

The core area in the proposed biosphere reserve consists of one national park (2,358 ha), 27 Natura 2000 sites, 35 nature reserves (3,658 ha) and 27 forest habitat protection areas (64.6 ha). Some of the protected areas overlap, making the total core area 16,281ha.

Nature reserves, municipal reserves and national park
Nature reserves are declared by the County Administrative Board or a municipality (municipal reserves), and are protected under special regulations included in the decision statements. National parks are designated with the consent of Parliament and are governed by special provisions.

Natura 2000
Areas containing high natural values and that are representative for the region in which they are located, are included in the EU ecological network Natura 2000. When the EU commission designates a Natura 2000 site, it is not automatically protected but is included in a special register and must be prioritised by authorities working with protection. Natura 2000 sites have conservation plans for each designated habitat, which strengthen the protection of the area.

Forest habitat protection areas
Small land and water areas in forests, which constitute habitats for endangered animal and plant species, are protected under Swedish legislation as so called forest habitat protection areas. Areas that are otherwise worthy of protection may also be designated. Habitat protection areas are managed to protect the natural values.

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.)

In the buffer zones special consideration must be taken in areas of national interest for the purpose of nature conservation, areas of national interest for the purpose of culture heritage conservation, Ramsar site, nature conservation areas, forest with nature conservation agreements, fish protection areas and protected shores. Special regulations for the abovementioned protected areas are included in decision statements. Documents that confirm the status of theses areas are found in Appendix 4.

The proposed biosphere reserve contains 14 areas of national interest for the purpose of cultural heritage conservation, one of which partly extends beyond the area (23,218 ha), 13 areas of national interest for nature conservation (34,912 ha), six nature conservation areas (15,879 ha), a Ramsar site that partly extends beyond the area (approx. 410 ha), 14 forest nature conservation agreements (87.2 ha) and protected shores. Some protected areas overlap, making the total area of the buffer zones 40,876 ha.

Nature conservation areas
Nature conservation areas are valuable areas of land or water protected under the Environmental Code. Nature conservation areas were designated by county administrative boards until the end of the 1990s. When the Environmental Code came into force on 1 January 1999, nature conservation areas were handled as nature reserves, even if the earlier decisions remain.

Ramsar site
Included in the proposed biosphere reserve is part of Lake Dättern, classified as a Ramsar wetland of international importance. The area is protected under the Convention of Wetlands (also known as the Ramsar Convention), which is a global nature conservation agreement to safeguard wetlands and water environments and to use them in a sustainable way. The Ramsar Convention came into force in 1975.

National interest
National interests are defined and regulated in the third and fourth chapters of the Environmental Code. According to chapter four, national interests are designated and defined by Parliament. An environment or object of national interest means that it contains natural and cultural assets that are of importance for the whole country. The aim of defining national interests is to safeguard the use of something or protect something for the future. Areas regarded as national interest must be protected against measures that may damage the natural environment.

The fourth chapter of the Environmental Code contains special provisions concerning the management of land and water areas. Lake Vänern, including islands and shore areas is an area of national interest for tourism and outdoor recreation. *"In Lake Vänern, including islands and shore areas, special consideration shall be given to the interests of tourism and outdoor recreation, in particular outdoor recreational exercise, in connection with assessments of the permissibility of development projects or other environmental intrusion*" (Environmental Code, chapter 4, section 2). The same applies to the area around the Göta Canal between Karlsborg and Sjötorp, where Sjötorp is located within the proposed biosphere reserve. In the areas mentioned, development projects or other environmental interventions may only be undertaken where they can be implemented in a manner that does not significantly damage the natural and cultural assets of these areas.

Special and unique cultural environments can also be of national interest for the purpose of conservation of the cultural environment. Such areas show how humans have used resources in the landscape and in nature throughout history. Such environments may also be linked to the development of society, economic development, vernacular architecture, social conditions, etc. These areas must be protected from damage and managed in a way that they are preserved for the future. The Swedish National Heritage Board determines which areas are of national interest for the purpose of conservation of the cultural environment.

The following categories of national interest are included in the proposed biosphere reserve:

- National interest for the purpose of nature conservation*
- National interest for the purpose of conservation of the cultural environment*
- National interest for the purpose of outdoor recreation
- National interest for the purpose of commercial fishing
- National interest, Chapter 4, section 2
- National interest, Chapter 4, section 3
-

* Buffer zones.

Shore protection areas

Shore protection applies by the sea, lakes and watercourses according to the Environmental Code, chapter 7, section 13. The purpose of shore protection is to maintain good living conditions for plant and animal species on land and in water and to assure public access to outdoor recreation facilities. For Lake Vänern, shore protection extends to 300 metres from the shoreline, and for inflowing watercourses shore protection applies 100 metres from the shorelines on both sides.

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

Within the proposed biosphere reserve land use is regulated according to rules and criteria that apply in Swedish society. This includes the Environmental Code, the Planning and Building Act, and the EU Water Directive.

The Planning and Building Act regulates physical planning for construction and the exploitation of land and water resources. The legislation dates from 1987 and strives to promote a sustainable development of society with equal and good living conditions for present and future generations. The municipalities have the sole responsibility for planning their own use of land and water resources and must maintain and update a comprehensive plan over the whole municipality.

The Environmental Code is based on recognition of the fact that nature is worthy of protection and that our right to modify and exploit nature carries with it a responsibility for wise management of natural resources. The Environmental Code includes, among other things, the preservation of biological diversity, the protection and preservation of valuable natural and cultural environments, and the management of materials, raw materials and energy (reuse and recycling) with a view to establish and maintain natural cycles.

The Forestry Act, which applies to all forest owners in Sweden, regulates yields and considerations. The Forestry Act dates back to 1979, and the first paragraph reads: "*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. Forest management shall also take into account other public interests*".

The Heritage Conservation Act contains the basic regulations for the protection of Sweden's heritage, including buildings, ancient remains, archaeological finds, ecclesiastical monuments and specified artefacts. The Heritage Conservation Act starts with the words: *"Preserving and protecting our historic environment is a national concern. It is a responsibility shared by all of us. Both private persons and public authorities must show consideration and care towards the cultural environment. Anyone who plans or carries out work must ensure that damage to the cultural environment is, as far as possible, avoided or limited.*"

Lake Vänern contains *Protected fish areas* for pike-perch *(Esox lucius)*, salmon *(Salmo salar)* and brown trout *(Salmo trutta lacustris)*. In the proposed biosphere reserve, these protected areas coincide with important spawning and nursery areas for pike-perch and the local population of Tidan brown trout. Special provisions are made by the Swedish Board of Fisheries and are included in their fishing regulations. In general, the fishing of salmon and brown trout that are not marked by fin-clipping is prohibited all year round. Between 15 August and 31 October it is prohibited to fish for salmon and brown trout in the river Tidan protection area, i.e. a geographical area largely corresponding to Mariestadsfjärden bay. From 15 May to 15 June fishing for pike-perch is forbidden in certain areas.

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 16,281 ha
Municipal land: 92 ha = 0.6%
State-owned land: 4,392 ha = 27%
Other owners: 11,797 ha = 72.4%

17.5.2. Buffer zone(s):

The buffer zones cover 40,876 ha
Municipal land: 2,907 ha = 7.1%
State-owned land: 1,137 ha = 2.8%
Other owners: 36,832 ha = 90.1%

17.5.3.Transition area(s):

The transition area covers 221,443 ha
Municipal land: 3,752 ha = 1.7%
State-owned land: 18,279 ha = 8.3%
Other owners: 235,970 ha = 90%

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.]

The Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve includes the central transition areas of the three municipalities and the most valuable natural and cultural environments. It is therefore natural that the comprehensive *policy and implementation mechanism* for the biosphere reserve will consist of the coordinated contents of the outline plans of the three municipalities. When outline plans are drawn up, strict requirements are made on civic participation and democratic support for the plans. In addition to extensive consultation with the public and relevant authorities, organisations, etc., the plans must be available for public scrutiny for at least two months before being adopted by the municipal councils. When a decision has been reached about the proposed biosphere reserve, the comprehensive plans will be updated, starting in 2010.

Until the comprehensive plans are updated with regards to the biosphere reserve, the regulation of land use in the candidate area is as follows: First of all, it is worth mentioning that the feasibility study for the biosphere reserve has been considered by the relevant municipal councils. Existing comprehensive plans and future plans with related documents already treat issues arising from the proposed biosphere reserve. Central documents that provide the basis for assessing land use include nature conservation plans for Mariestad and Lidköping municipalities, water conservation plan for Lake Vänern, climate strategy for Lidköping, etc. Land use in the proposed biosphere reserve is regulated in Swedish legislation. Justifying documents for land use and management plans are included in Appendix 4.

The steering group for the proposed biosphere reserve has adopted a vision, a mission and a development plan. The development plan is a living document which is upgraded and adapted to accommodate changes in the community at large. The biosphere reserve and its activities will be evaluated as early as 2013. The process to establish a land use policy for the proposed biosphere reserve has been under way during the candidacy, and will continue within the new biosphere reserve organisation.

Vision
The Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve is an area where there is balance between the landscape, ecosystems and biological diversity, and sustainable economic and social development. Through collaboration between stakeholders, and focus on research and education of the public, the biosphere reserve will develop into an example and a model for sustainable development.

Mission
The Lake Vänern Archipelago and Mount Kinnekulle biosphere reserve will strive to:

- Promote long-term development based on the natural and cultural assets in the area, which can offer new income opportunities for land-based industries, tourism, local stakeholders, and many others.
- Strengthen the natural, cultural and recreational values in the area.
- Increase access for local residents and visitors to good natural, cultural and recreational environments on land and in water.
- Promote a sustainable development of land-based industries and other businesses linked to the use of biological diversity and cultural environments.
- Encourage increased collaboration between local expertise, research, education and commerce.

Development plan and implementation mechanism for the Lake Vänern Archipelago and Mount Kinnekulle biosphere reserve
The Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve will:

1) Promote economic and societal development that is ecologically and socially sustainable. For the biosphere reserve this means:
    i. Actively working for the development of ecotourism and cultural tourism in the area together with entrepreneurs, tourist offices, info-points and destination companies.
    ii. Working with the development of infrastructure for hiking, cycling, paddling, and riding (*Action plan for ecotourism development 2012*).
    iii. Promoting, supporting and actively participating in projects that lead to the development of local products, more housing alternatives in the area, and trademark development.
    iv. Working with sustainable planning together with the municipalities.
    v. Promoting the use of public transport by visitors travelling to, from and within the area.
    vi. Producing ecological landscape plans together with relevant stakeholders.

These efforts are expected to result in the area becoming nationally and internationally recognised as an ecotourism destination. All tourist organisations in the area will be familiar with the ecotourism and cultural tourism activities on offer. They will actively market these activities, and the biosphere reserve will continue to update, improve and create more travel ideas and packages. This will be done in collaboration with tourist offices and destination companies. The biosphere reserve will have its own theme site on the tourism portal for western Sweden, www.vastsverige.com.

A well-developed infrastructure for walking, paddling, cycling and riding makes the area attractive for many target groups, but is also a great asset for local residents. It should be easy to get around in the area

without having to use a car. This also increases the opportunities for experiences in the immediate surroundings, which increases local tourism and supports local enterprise. Infrastructure for soft tourism also encourages people to move to the area. Reduced car dependency and increased public health are long-term desired effects.

A common trademark that links those who are active within the biosphere reserve is a top priority. The trademark provides a stamp of quality and contributes to stakeholders taking pride in living in such a rich natural and cultural landscape and taking responsibility for carrying out their activities in a sustainable way.

2) Contribute to the conservation of landscapes, ecosystems, species and diversity. This can be achieved by:
    i. Stimulating the development of local ecological products.
    ii. Initiating and/or actively participating in projects with focus on biodiversity, endangered species and ecosystem services.
    iii. Pointing to alternatives that increase competitiveness (certifications, Nature's Best).
    iv. Contributing to increased understanding of landscape values through information.
    v. Contributing to increased knowledge about local natural and cultural values through seminars and courses/study circles.
    vi. Capitalising on ecosystem services.

Expected results and effects:
Increased trade in local products. Increased range of local products in shops in local towns and in farm shops, and where quality labels on products increase their appeal. This development can with advantage be linked to the Leader programme, in which the biosphere reserve covers and joins two Leader areas.

The area will become a national pilot area for sustainable community planning based on the biosphere reserve zonation. Increased knowledge about the value of the ecosystem services in the area has a bearing on community planning and stakeholder land use. The municipalities jointly strive to minimise any adverse effects on ecosystem services and to make their activities energy efficient. In this way, the municipalities will set a good example for others in the area.

Increased awareness about the local biodiversity and endangered species. The biosphere reserve will receive publicity for project activities that are carried out with the aim to contribute to the conservation of biodiversity and increase public awareness and knowledge about natural and cultural values in the landscape. Schools will assumed species responsibility, and hold lessons in the countryside, which helps foster a natural attitude in the younger generation towards the environment.

A sustainable use of the landscape is achieved, for example, by the biosphere reserve working to increase the percentage of continuous forestry together with the Swedish Forest Agency, forest companies and landowners, and by active support from the biosphere reserve for the objectives in the water management plan for Lake Vänern.

3) Facilitate demonstration projects, education and work experience, research and environmental monitoring. The biosphere reserve will:
    i. Constitute a contact area for national and international MAB networks.

ii. Constitute a contact area for students at universities, colleges and advanced vocational programmes.
iii. Support local initiatives that lead to new knowledge and/or technological development.
iv. Continue to work for a nature school in the biosphere reserve with the aim to foster a natural attitude among children and youth towards the environment.
v. Participate in the work to design and develop naturum Vänern Archipelago and actively support the creation of a naturum on Mount Kinnekulle.

Expected results and effects:
Increased knowledge about the biosphere reserve. The biosphere reserve is included in a number of research projects and has a databank with ideas for student research and degree projects. Local participation permeates projects that concern the stakeholders' geographical area. Expected effects include innovative solutions and new technology within land-based industries and subject areas, such as alternative energy sources and environmentally-driven enterprise.

Knowledge about the biology of the biosphere reserve is conveyed at naturum and other major information centres, such as the Lake Vänern Museum. In addition, children and young people will gain a natural attitude to the environment through a well-developed nature school.

4) Develop international collaboration. This is achieved through:
   i. Collaboration with partner area
   ii. Inclusion in Interreg cooperation
   iii. Participation in municipal twinning arrangements

Expected results and effects:
The Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve will be involved in a number of international collaborations, including a well-developed collaboration with Schorfheide-Chorin. Such collaboration is based on one of the above themes (1-3) and thereby contributes to the development of the biosphere reserve within specialist areas.

5) Gain local support for the development of the biosphere reserve. This can be achieved through:
   i. Developing the network in the biosphere reserve.
   ii. Initiating project groups.
   iii. Cooperating with two Leader areas (Leader North Skaraborg and Leader West Skaraborg).

Expected results and effects:
Good inter-sectorial relationships between stakeholders in the area, and well-established networks lead to efficient processes and good results within conservation and development. Lake Vänern Archipelago and Mount Kinnekulle will become a well-known concept that evokes pride and a sense of security among our citizens and that contributes to local sustainable development.

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. Decribe the steps taken and the stakeholders involved]

The feasibility study for Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve started in May 2005. The feasibility study was a collaboration project carried out by the Götene, Lidköping and Mariestad municipalities. The study was supported by the Swedish Environmental Protection Agency's state grants for municipal and local nature conservation (LONA), municipal funds and funds from the environmental committee of the Västra Götaland Region. In addition, a large number of organisations and local stakeholders contributed to the feasibility study through their own efforts. In total, the feasibility study involved 35 local and regional stakeholders. The private, voluntary and public sectors were represented. During a period of one year, the Lake Vänern Archipelago and Mount Kinnekulle area was investigated as to whether it contains the qualities required to become a biosphere reserve, and whether it would be realistic to in the long term carry out and develop working methods that are in line with the common strategy for the world network of biosphere reserves. Results from the feasibility study demonstrate that the area has a good potential for fulfilling the UNESCO criteria and that there is strong local interest for creating a biosphere reserve.

Local support is vital both during the feasibility phase and the candidacy phase, as well as for the future work as a biosphere reserve. In the proposed biosphere reserve, processes and the day-to-day organisation of the area will engage local, regional and public stakeholders. New interdisciplinary collaboration forms have emerged that also cross administrative borders. This is one of the great strengths of the area and one that will be included in the continuing process. The local network has grown during the candidacy to include more regional stakeholders, such as rail administration, road administration, public transport and regional tourist operators. It is clearly evident that local interest is gradually increasing; one indicator is the growing e-mail list for the area newsletter. There are no indications that this process will come to a halt.

During the local biosphere process, various project and working groups have formed to meet the requirements of specific issues. Each group has a unique composition, and together they represent the voluntary, public and private sectors. The initiative for such groups/projects may be local or central. The biosphere reserve coordinator and the candidate area working group have also been engaged in external groups to provide expertise about the biosphere model and sustainable development. The following groups are examples of this:

- Mount Kinnekulle bus
- Hiking trail inventory
- Cycling issues
- Development of information strategy
- Signs – layout and location
- Feasibility report (3 reference groups + 1 working group)
- Development of Interreg project
- Local participation in the development of travel ideas
- Working group for naturum at Läckö
- Ambassador programme
- Local forest sector advisory council
- Läckö development group
- Naturally grazed meat

- Regional landscape strategy (project management group)
- Kållandsö – a rich and flourishing landscape
- Sustainable travel for soft tourism
- Reference group for *Water and society*
- Working group for the nomination form

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 development of Lake Vänern Archipelago and Mount Kinnekulle into a biosphere reserve is an exciting process where *collaboration around sustainable development* is central. Collaboration and local participation create a consensus around the natural and cultural values in the area. These values constitute the assets of the proposed biosphere reserve and provide the basis for a sound development of the area. During the process of becoming a biosphere reserve, we strive to find a balance between usage and conservation and learn to identify innovative development opportunities based on landscape resources. But most of all, we add a more sustainable perspective to our lives and day-to-day activities.

For the municipalities, the biosphere reserve offers an opportunity to coordinate their comprehensive and future plans, which results in a powerful municipal tool for sustainable development. The comprehensive plans also give a coordinated view of state and municipal interests in the area, regarding physical planning.

Lake Vänern Archipelago and Mount Kinnekulle will strive to:

- Promote a long-term development, based on natural and cultural qualities in the area, which can bring new income opportunities for land-based industries, tourist companies, local stakeholder and many others.
- Safeguard and strengthen natural, cultural and recreational values.
- Increase access for local residents and visitors to good natural, cultural and recreational environments both on land and in water.
- Promote a sustainable development of land-based industries and enterprises linked to the use of biological diversity and cultural environments.
- Encourage increased collaboration between local expertise, research, education and commerce.

The proposed biosphere reserve will become a major collaboration partner for a wide range of organisations, associations and authorities that will benefit from the biosphere reserve. The biosphere reserve will be an umbrella organisation linking many local and regional forces around issues of specific importance for the area. By involving the parties concerned early on in the process, efficient interactions will be made between the stakeholders, which in turn drive the processes forward.

17.6.3 The designated authority or coordination mechanisms to implement this plan or policy (Name, structure and composition, its functioning to date)

The biosphere reserve will be organised as a non-profit organisation: *Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve*. The organisation will be represented by a board which will look after the interests and take care of the organisation's concerns. The board will execute decision taken at the annual meeting and will also be responsible for the economy and accounts. In the day-to-day running

of the biosphere reserve, the board will be responsible for manning the biosphere office, which also involves the hiring of staff. The board will consist of members from the private, voluntary and public sectors, with the public sector forming a minority.

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 proposed biosphere reserve includes areas where land use is regulated through Swedish legislation, individual voluntary agreements, or other financial incentives such as nature conservation agreements, management agreements and special grants for conservation. Nature reserves and Natura 2000 sites have been established for areas worthy of protection, and municipal reserves have been set up in some areas with valuable biodiversity. This means that local political decisions have been taken for the benefit of natural and recreational values. Special conservation grants are linked to such protected areas to safeguard their management.

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 development of Lake Vänern Archipelago and Mount Kinnekulle into a biosphere reserve has been a highly open process, where all those interested have been given the opportunity to participate. The thorough feasibility study was followed up by a three-year candidacy with the aim to gain further support for the biosphere work, develop the network and to prepare the UNESCO nomination. Since 2005, a large number of stakeholders have been engaged in the biosphere work, including the preparation of material for the nomination. During the process, the number of participating stakeholders has more than doubled. Reference groups, mainly consisting of non-profit organisations have had an advisory function. After the first phase (feasibility study), the reference groups were amalgamated into a larger advisory group. The groups consist of representatives from:

- AB Göta Canal Company
- Brommö interest group
- Dacapo Hantverksskola
- Fjällalaget
- Swedish outdoor confederation Mariestad
- Swedish outdoor confederation Lidköping
- Federation of private enterprises Mariestad
- Götene-Kinnekulle society for nature conservation
- Götene-Lidköping Lake Vänern Tourism AB
- Kållandsö association
- University of Skövde
- Swedish Yachting Association
- Lidköping bird watching group
- Lidköping society for nature conservation
- Mariestad bird watching group
- Mariestad society for nature conservation
- Mariestad trade and industry society
- Mariestad anglers
- Naturally grazed meat

- Götene trade and industry society
- Rackeby archaeological society
- Sjötorp folklore society
- Swedish Forest Agency
- River Tidan Water conservation Society
- Torsö residents' association
- Torsö folklore and sports society
- Vadsbo folklore society
- Vänerbygden food producers
- Västergötland Museum
- Commercial fishermen's association
- Örslösa folklore society
- Övre Lugnås interest group

The decision-making group, i.e. the steering group for the biosphere candidate area, includes representatives from the Götene, Lidköping and Mariestad municipalities. Expertise has been co-opted from the County Administrative Board, Västra Götaland Region, SLU, Gothenburg University and Lake Vänern Museum. The steering group has decided on the focus of activities in the biosphere candidate area.
The proposed biosphere reserve has continuously published information to the public through the website, quarterly newsletters, brochures, annual reports, events, media, talks, seminars and lectures. The public has been able to ask questions and participate in the work to develop the proposed biosphere reserve.

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

As the implementation of the proposed biosphere reserve is based on regulatory tools already in use in society, such as nature conservation agreements, a starting year cannot be given here. It can be stressed, however, that the development plan that describes the candidate area's action strategy was presented to the steering group in 2006 and adopted thereafter. The development plan is a living document which is continuously updated. The activity plan for the biosphere reserve will be adopted by the board of the non-profit organisation at the start of the first financial year.

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]

During the candidacy, the proposed biosphere reserve has had an annual budget of SEK1, 200,000 - corresponding to approximately USD200,000 or approximately €130,000 (as per exchanges rates in March 2007). The funding should cover the running of and coordination of the biosphere candidate area, information and marketing, as well as networking and to some extent development projects. External funding for specific projects will be sought from national and international programmes.

During the candidacy, a strong focus has been on building systems and networks between the candidate area and existing authorities. The idea is that the biosphere reserve should not become a further

administrative body/authority, but that existing resources and forces in the area should be strengthened by the regional perspective offered by the biosphere reserve.

During the candidacy the annual funding has been broken down as follows:

National funding:	SEK 570,000	(47.5%)
Regional funding:	SEK 210,000	(17.5%)
Local funding:	SEK 420,000	(35%)
Total	**SEK 1,200,000**	**(100%)**

After the candidacy, with the creation of a biosphere reserve, municipalities will allocate SEK7.10 /inhabitant/year, and a fixed annual fee of SEK35,000 per municipality. An additional SEK300,000 per year is available from the Swedish Environmental Protection Agency. The basic funding of the biosphere reserve is thus provided by Götene, Lidköping and Mariestad municipalities and the Swedish Environmental Protection Agency, where the municipalities contribute to 68% of the funding.

A large part of the biosphere reserve's activities will be project based. There are good opportunities for funding such projects through EU programmes, rural programmes and various foundations.

17.8. Authority(ies) in charge

17.8.1.The proposed biosphere reserve as a whole:

Name: Götene municipality, Lidköping municipality and Mariestad municipality

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]

At central level, the core areas of the biosphere reserve are administered by two government authorities: The Swedish Environmental Protection Agency and the Swedish Forest Agency

At regional and local levels, the following authorities ensure that current legislation is observed:
Regional authorities: County Administrative Board of Västra Götaland, Swedish Forest Agency
Local authorities: Götene municipality, Lidköping municipality, Mariestad municipality

The authorities are listed below (chapter 20.2)

17.8.3.The buffer zone(s)

Coordination and administration of the biosphere reserve's buffer zones will be carried out centrally:

Swedish Environmental Protection Agency and Swedish National Heritage Board

At regional and local levels, the following authorities ensure that current legislation is observed:
Regional authorities: County Administrative Board of Västra Götaland, Swedish Forest Agency
Local authorities: Götene municipality, Lidköping municipality, Mariestad municipality

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:
( )	UNESCO World Heritage Site	
(X)	RAMSAR Wetland Convention Site	Ramsar site Dättern
(X)	Other internationa/regional l conservation conventions/directives [Please specify] The European Commission's directive 79/409/EEG dated 2 April 2009 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 Habitats Directive).	
( )	Long term monitoring site [Please specify]	
( )	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 electonic 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

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: Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve
Street or P.O. Box: Magasingatan 4
City with postal code: SE 542 86 Mariestad
Country: Sweden
Telephone: (+46) 501 75 50 00 (Switchboard)
Telefax (or telex): (+46) 501 75 57 99
E-mail: info@vanerkulle.se
Web site: www.vanerkulle.se

20.2. Administering entity of the core area:

Different authorities administer and manage the core areas within the proposed biosphere reserve. They are described in chapter 7. Information about the authorities concerned is found on the following web sites:

Name: Swedish Environmental Protection Agency
Web site: www.naturvardsverket.

Name: County Administrative Board of Västra Götaland
Web site: www.o.lst.se

Name: Swedish Forest Agency
Web site: www.svo.se

Name: Mariestad municipality
Web site: www.mariestad.se

20.3. Administering entity of the buffer zone:

Different authorities administer and manage the buffer zones within the proposed biosphere reserve. They are described in chapter 7. Information about the authorities concerned is found on the following web sites:
Name: Swedish Environmental Protection Agency
Web site: www.naturvardsverket.se

Name: Swedish Heritage Board
Web site: www.raa.se

Name: County Administrative Board of Västra Götaland
Web site: www.o.lst.se

Name: Swedish Forest Agency, Region West, Skaraborg District
Web site: www.svo.se

Name: Götene municipality
Web site: www.gotene.se

Name: Lidköping municipality
Web site: www.lidkoping.se

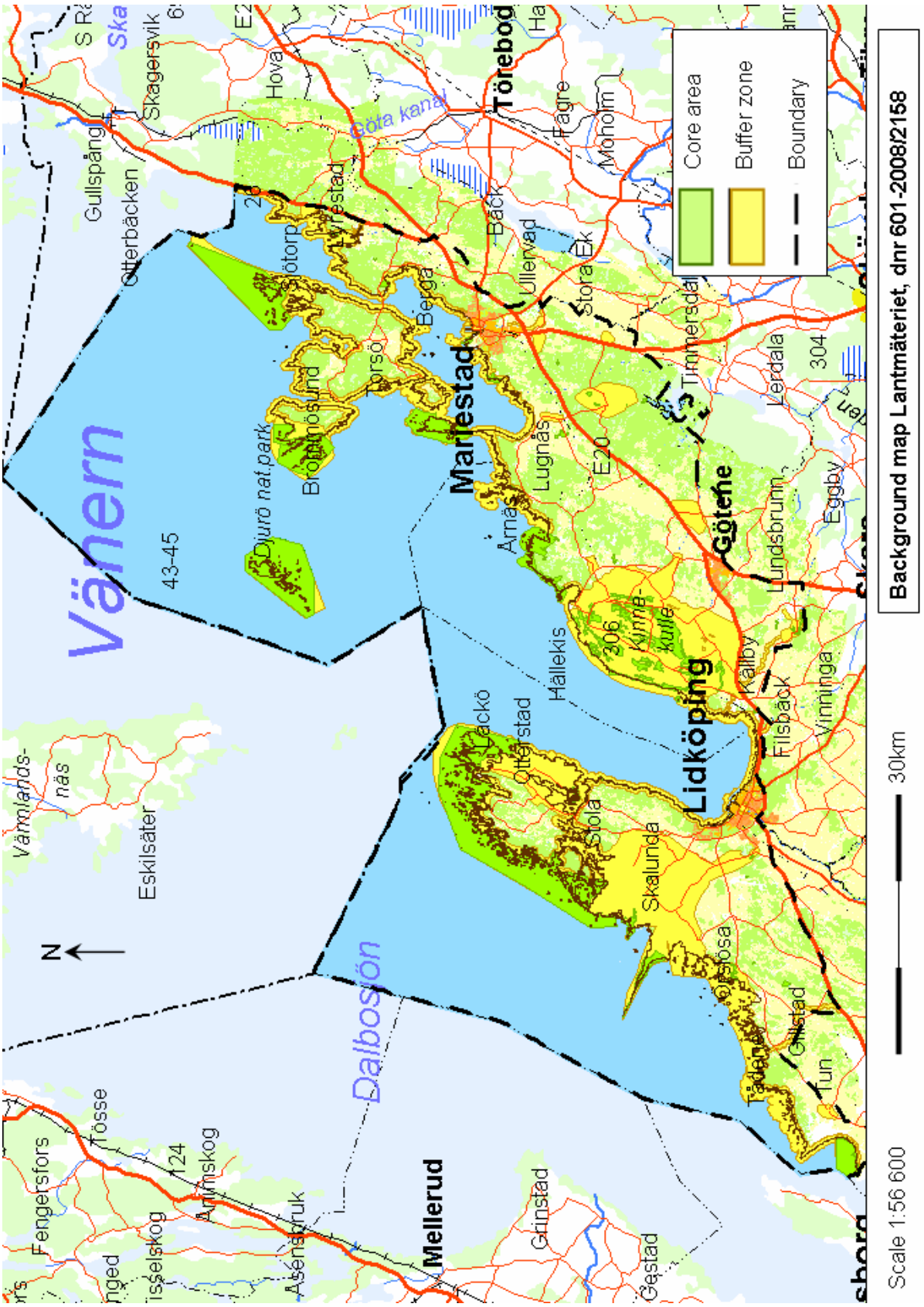
Name: Mariestad municipality
Web site: www.mariestad.se

Appendix 1. General location map

http://europa.eu/abc/maps/members/sweden_sv.htm

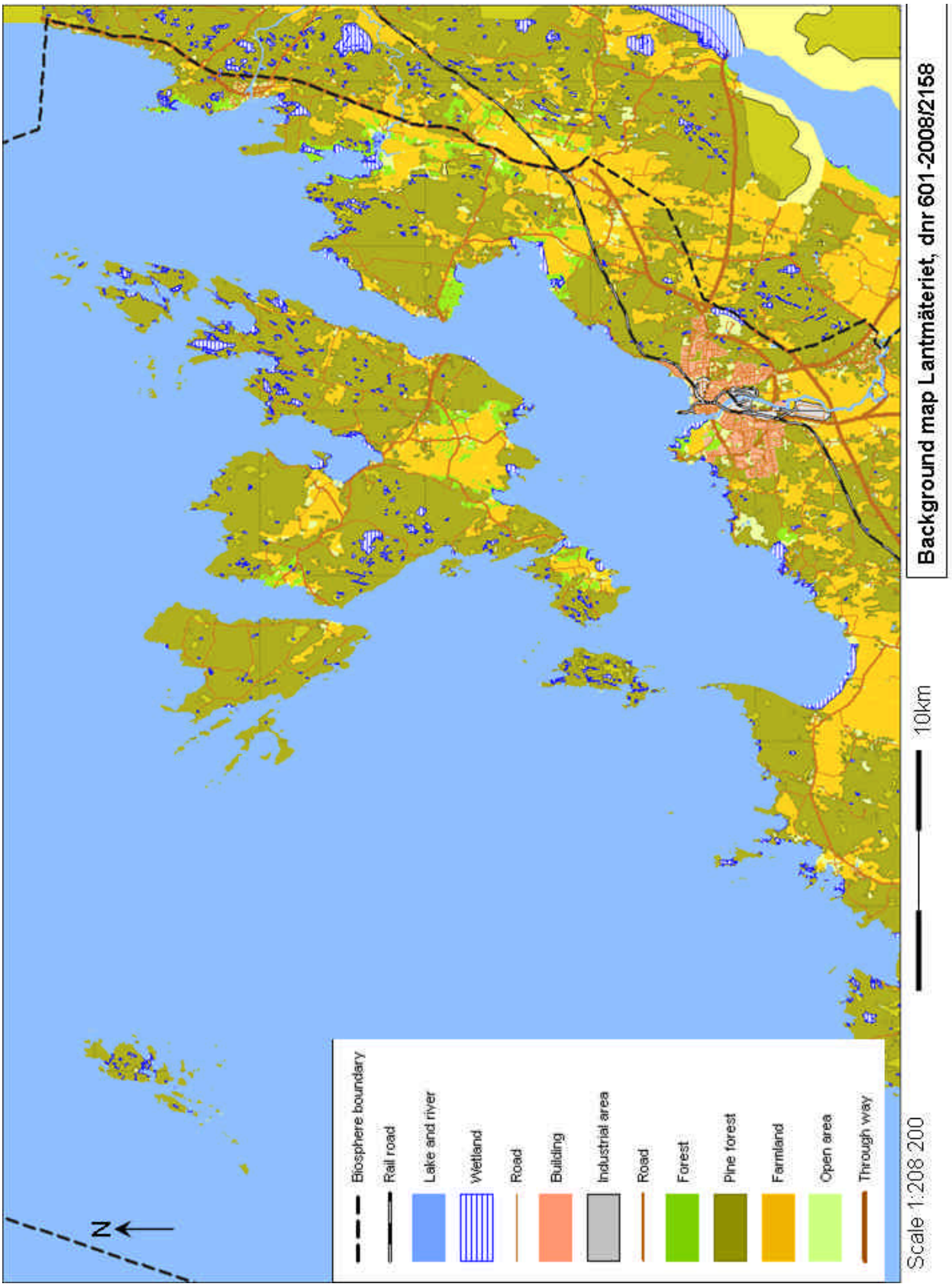
Appendix 2. Biosphere reserve zonation map

Comment: The transition area constitutes the parts of the proposed biosphere reserve that are *not* core areas or buffer zones.

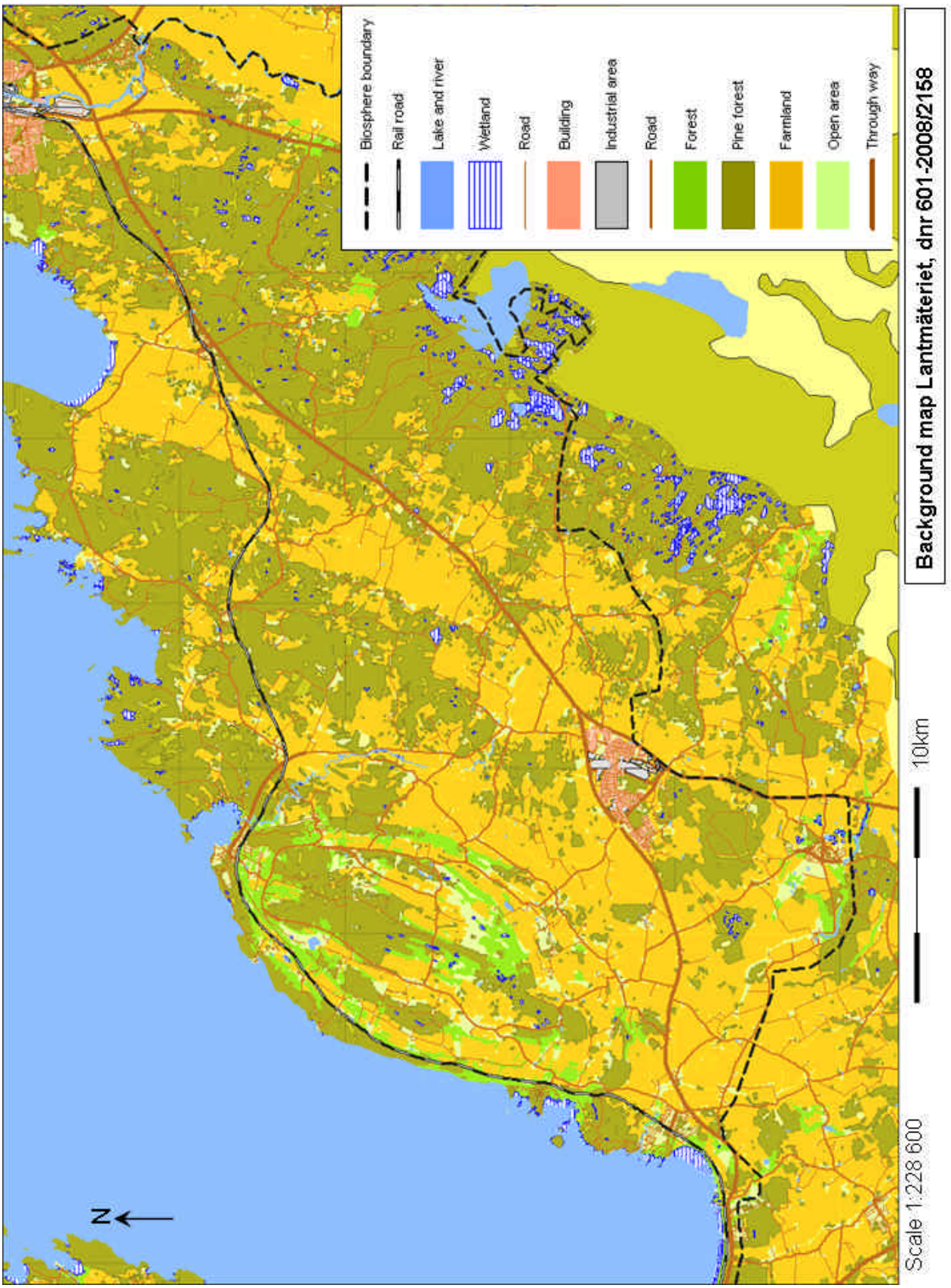


Appendix 3. Land cover and vegetation maps

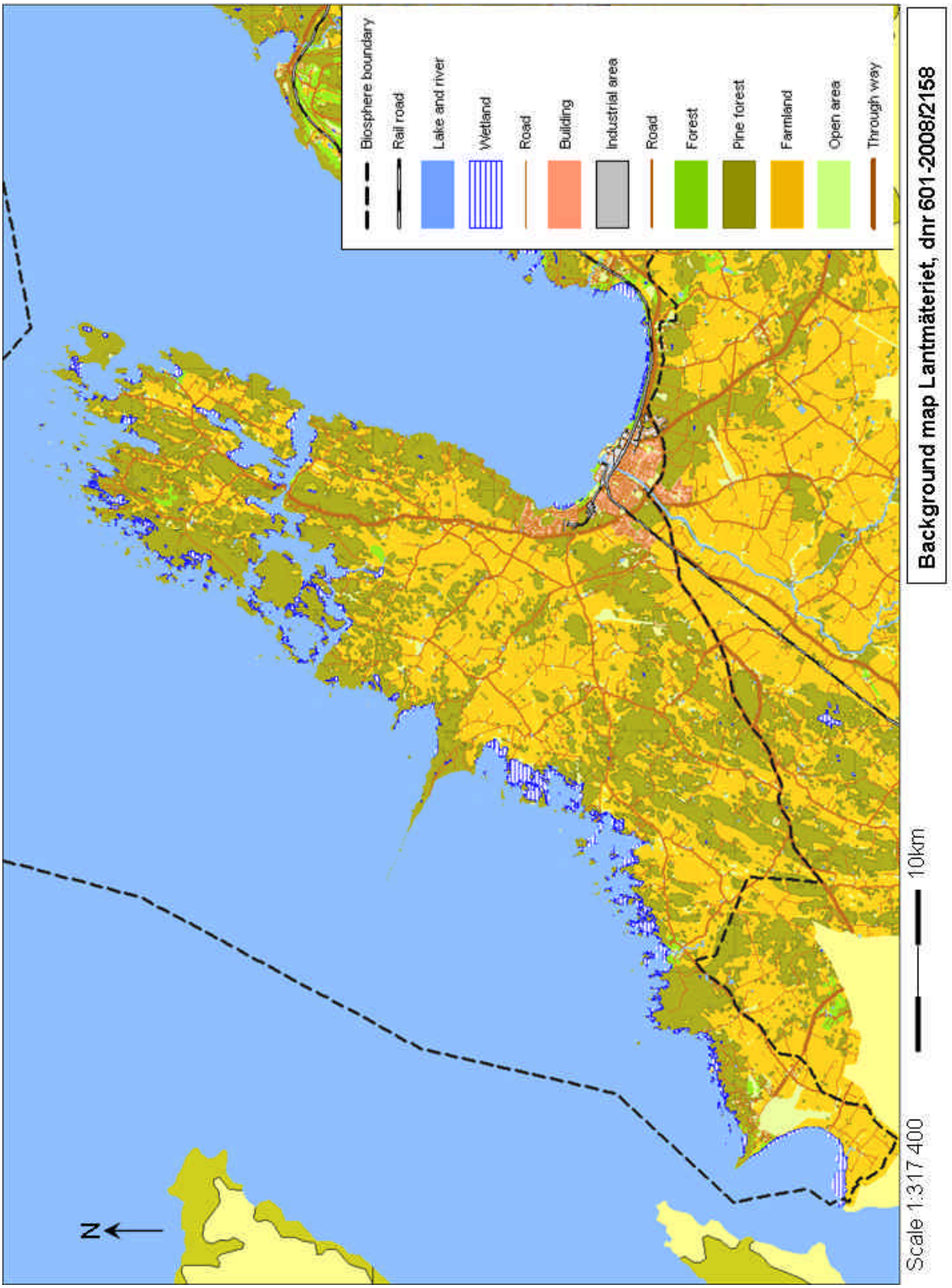
Area surrounding Mariestad, north-eastern part of the proposed biosphere reserve.



Area surrounding Kinnekulle and Götene, central part of the proposed biosphere reserve.



Area surrounding Lidköping, south-western part of the proposed biosphere reserve.



Appendix 4a. List of legal documents

SKOGSSTYRELSEN

1(2)

Datum
2008-04-03

Diarienr
2008/1749

Skaraborg
Anders Wiborg
Lundenvägen 2, 541 39 Skövde
anders.wiborg@skogsstyrelsen.se
Tfn 0500-381203
Fax 0500- 413217

Biosfärkandidatområdet Vänerskärgården med Kinnekulle
Johanna MacTaggart

Beslutade biotopskydd och upprättade naturvårdsavtal inom Biosfärkandidatområdet Vänerskärgården med Kinnekulle

Listan visar av Skogsstyrelsen beslutade biotopskydd enligt § 6 i förordningen om områdesskydd enligt miljöbalken samt upprättade naturvårdsavtal mellan Skogsstyrelsen och berörda markägare inom Biosfärkandidatområdet Vänerskärgården med Kinnekulle.

Biotopskydd

Objektår	*Objektnr*	*Biotoptyp*	*Ha totalt*	*Ha skog*
1994	422	Äldre naturskogsartade skogar	6.4	6.4
1995	314	Äldre naturskogsartade skogar	1.1	1.1
1996	1	Äldre naturskogsartade skogar	2.4	2.4
1996	414	Äldre naturskogsartade skogar	3.6	3.6
1997	89	Kalkmarksskogar	4	4
1998	333	Källor med omgivande våtmarker	1	1
1999	445	Hassellundar och hasselrika skogar	2.2	2.2
2000	458	Äldre naturskogsartade skogar	3	3
2000	471	Äldre naturskogsartade skogar	0.5	0.5
2000	515	Äldre naturskogsartade skogar	1.3	1.3
2002	73	Äldre naturskogsartade skogar	4.5	4.5
2002	107	Äldre naturskogsartade skogar	3.2	2.8
2002	108	Äldre naturskogsartade skogar	2.8	2.2
2002	119	Äldre naturskogsartade skogar	2.9	2.6
2003	54	Örtrika allundar	0.2	0.2
2003	447	Mindre vattendrag och småvatten med omgivande mark	2.1	2.1
2003	563	Rik- och kalkkärr	0.6	0.6
2003	564	Äldre naturskogsartade skogar	2.5	2.5
2004	403	Äldre naturskogsartade skogar	2.8	2.8
2004	404	Äldre naturskogsartade skogar	2	2
2004	405	Äldre naturskogsartade skogar	0.6	0.6
2004	408	Äldre naturskogsartade skogar	1.9	1.9
2004	509	Äldre naturskogsartade skogar	3.6	3.6
2004	510	Äldre naturskogsartade skogar	1.7	1.7

2004	511	Äldre naturskogsartade skogar	1.2	1.2
2004	512	Äldre naturskogsartade skogar	2.8	2.8
2007	6949	Äldre naturskogsartade skogar	3.7	3.7

Naturvårdsavtal

Objektår	*Objektnr*	*Biotoptyp*	*Ha totalt*	*Ha skog*
2002	540	Kulturmark, hage, skogsbete	7.1	7
2003	85	Kulturmark, hage, skogsbete	8.3	8.3
2003	138	Naturskogsartad lövskog	6.3	6.3
2003	139	Kulturmark, hage, skogsbete	6.7	6.7
2003	140	Naturskogsartad barrskog	3.6	2.5
2003	274	Naturskogsartad barrskog	13.8	12
2003	566	Kulturmark, hage, skogsbete	9	9
2004	179	Naturskogsartad lövskog	2	2
2004	180	Naturskogsartad lövskog	1.4	1.4
2004	181	Kantzon, korridor, bäck, ravin	2.1	2.1
2004	448	Naturskogsartad barrskog	4.3	4.3
2005	412	Naturskogsartad barrskog	19.3	19.3
2006	619	Naturskogsartad barrskog	1.7	1.7
2006	620	Naturskogsartad lövskog	1.6	1.6

På Skogsstyrelsens vägnar

Anders Wiborg
Distriktschef

LÄNSSTYRELSEN
VÄSTRA GÖTALANDS LÄN

Naturvårdsenheten
Gunilla Odén
0501-60 54 07

2008-08-22

501-82290-2008

Sida
1(3)

Biosfärkandidatområdet Vänerskärgården med
Kinnekulle
Götene kommun
533 80 Götene

Beslutade naturreservat, Natura 2000-områden och riksintressen inom planerade biosfärområdet Vänerskärgården med Kinnekulle

Följande område utgör fastställd nationalpark enligt 4 § nationalparksförordningen inom det planerade biosfärområdet Vänerskärgården med Kinnekulle:

Beslutsdatum	*Namn*	*Areal*
1991-04-11	Djurö	2358

Följande områden utgör fastställda naturreservat enligt 7 kap 4 § miljöbalken (SFS 1998:808) inom det planerade biosfärområdet Vänerskärgården med Kinnekulle:

Beslutsdatum	*Namn*	*Areal (ha)*
1923-06-26	Kalvsund Storeberg	13
1926-06-05	Lunnelid Råda	4
1972-01-18	Klosterängen	5
1976-02-09	Skansen Läckö	6
1981-08-20	Surö bokskog	20
1981-08-20	Hästhagen	31
1982-09-13	Kinnekulle (naturvårdsområde)	7 000
1986-09-18	Hindens rev	12
1986-12-15	Kalvö skärgård (naturvårdsomr)	2190(277)
1987-04-27	Brommö skärgård	955(155)
1987-04-27	Västra Brommö (naturvårdsomr)	300(86)
1989-01-25	Hindens udde-Svalnäs (naturvårdsområde)	220(138)
1989-01-25	Parkudden(naturvårdsområde)	95(60)
1989-01-25	Kållands skärgårdar(naturvårdsområde)	6500(840)
1993-02-08	Gamla Ekudden	22
1995-09-19	Keduma-Torpa	17
1996-04-29	Lindbergs domänreservat	2
1996-05-28	Furunäsudde	3
1996-06-20	Trilleholme-Flatö	6
2001-10-11	Torsängen	3
2002-05-27	Dättern del av	3 740
2002-06-24	Västerplana storäng	95
2005-04-15	Onsö	813
2007-06-18	Sandviken	45
2007-08-28	Blomberg	81
2007-08-28	Gamleriket	21

2007-08-28	Såten	117
2007-08-28	Hellekis	21
2007-08-28	Gröne skog	36
2007-08-28	Råbäcks ekhagar	16
2007-08-28	Råbäcks sjöskog	29
2007-08-28	Råbäck	36
2007-09-18	Bestorp	125
2007-09-18	Tömsäter	65
2007-09-18	Munkängarna	76
2007-09-18	Strora Salen	29
2007-09-18	Skagen	99
2007-09-18	Hönsäters sjöskog	26
2007-09-18	Djurgården	100
2007-10-22	Östra och Västra Fågelön	12
2008-06-10	Österplana hed o vall utvidn	612
2008-06-10	Halla	60

Följande områden utgör av regeringen, med stöd av miljöbalken 7 kap 28 § (SFS 1998:808), beslutade Natura 2000-områden enligt habitatdirektivet (pSCI) och fågeldirektivet (SPA) inom det planerade biosfärområdet Vänerskärgården med Kinnekulle:

Regerings-beslut, pSCI	*Regerings-beslut, SPA*	*Objekt nr*	*Namn*	*Areal (ha) pSCI/SPA*
1995-12-01		SE0540063	Kinnekulle	7124
1995-12-01		SE0540076	Djurö-arna	2358
1995-12-01		SE0540077	Brommö Skärgård	1260
1995-12-01		SE0540078	Kalvö Skärgård	2162
1997-01-01		SE0540107	Fågelöarna	12
1997-01-01		SE0540110	Skarsen Läckö	7
1997-01-01		SE0540085	Kållands skärgårdar	6489
1997-01-01		SE0540116	Klosterängen	4
1997-01-01		SE0540101	Gamla Ekudden	25
1997-01-01		SE0540103	Surö bokskog	19
1998-12-01		SE0540206	Minnesfjället	9
	1998-12-01	SE0530126	Dättern	3740
2000-07-01		SE0540216	Skebykärret	1
2001-06-01		SE0540255	Mariedal	36
2001-06-01		SE0540257	Stensholmen	2
2001-06-01		SE0540258	Kedums-Torpa	19
2001-06-01		SE0540259	Svaneberg-Lilla Myran	30
2001-06-01		SE0540260	Lindbergs domänreservat	2
2004-04-01		SE0540319	Sunträlje, Recklan	10
2004-04-01		SE0540320	Per Olofsgården	8
2004-04-01		SE0540321	Hälledal	13
2004-04-01		SE0540328	Baggesten	15
2004-04-01		SE0540292	Drakaberget	29
2004-04-01		SE0540291	Källstorp	48
2004-04-01		SE0540294	Dyrenäs Sjötorp	6
2004-04-01		SE0540295	Hassle Grönebäck	2

Följande områden inom det planerade biosfärområdet Vänerskärgården med Kinnekulle utgör riksintresse för naturvården enligt 3 kap 6 § miljöbalken, beslutade av Naturvårdsverket den 28 september 2000:

Beslutsdatum	*Identitet*	*Områdesnamn*
1988-02-08	FR 04	Källandsö-Hindens rev-Svalnäs
1988-02-08	FR 02	Djurögarkipelagen, Brommö, Torsö-Fågelö
1988-02-08	FR 03	Göta kanal
1988-02-08	FR 05	Kinnekulle
1996-08-27	KR 015	Björsäter
1996-08-27	KR 016	Lugnåsberget
1996-08-27	KR 017	Mariestad
1996-08-27	KR 018	Karleby
1996-08-27	KR 019	Eka herrgård
1996-08-27	KR 02	Göta kanal
1996-08-27	KR 07	Ekens skärgård
1996-08-27	KR 08	Otterstad-Läckö
1996-08-27	KR 09	Källand
1996-08-27	KR 10	Tun
1996-08-27	KR 11	Kinnekulle
1996-08-27	KR 12	Forshem
1996-08-27	KR 13	Ova-Mariedal
1996-08-27	KR 60	Lidköpings stad
2000-09-28	NR 014031	Djurögarkipelagen
2000-09-28	NR 014032	Hovden o Västra Brommö
2000-09-28	NR 014033	Kalvöarna
2000-09-28	NR 014041	Källands skärgård
2000-09-28	NR 014051	Söne-Kedum-Tådene skärgård
2000-09-28	NR 014052	Hjortens udde-Hindens rev-Skalunda
2000-09-28	NR 014053	Parkudden
2000-09-28	NR 014054	Källandsö
2000-09-28	NR 014055	Kinnekulle
2000-09-28	NR 014056	Holmestad
2000-09-28	Nr 014057	Lugnåsberget
2000-09-28	NR 014068	Dättern med omgivningar
2000-09-28	NR 014070	Lundsbrunn-Mariedal
1982	Riksintresse	Vänern (enligt 4 kap Miljöbalken)
1974	Ramsarområde	Dättern

Gunilla Odén

Gunilla Odén

Kopia till:
MT

Appendix 4b. Translation of *List of legal documents*

Swedish Forest Agency

Skaraborg
Anders Wiborg
Lundenvägen 2, 541 39 Skövde
Anders.wiborg@skogsstyrelsen.se
Phone: 0500-381203
Fax: 0500-413217

Date
2008-04-03

Registration number
2008/1749 1(2)

Lake Vänern archipelago and Mount Kinnekulle
Biosphere Reserve Candidate
Johanna MacTaggart

Designated habitat protection areas and nature conservation agreements within the Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve candidate area

The list shows areas set aside as habitat protection areas by the Swedish Forest Agency under the Ordinance on Area Protection (section 6) according to the Environmental Code, and nature conservation agreements drawn up between the Swedish Forest Agency and landowners concerned within the Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve candidate area.

Habitat protection areas

Object year	***Object nr***	***Habitat type***	***Ha*** total	***Ha*** forest
1994	422	Natural and near-natural old-growth forest	6.4	6.4
1995	314	Natural and near-natural old-growth forest	1.1	1.1
1996	1	Natural and near-natural old-growth forest	2.4	2.4
1996	414	Natural and near-natural old-growth forest	3.6	3.6
1997	89	Forests on calcareous ground	4	4
1998	333	Springs and surrounding forest wetland	1	1
1999	445	Hazel groves and woods rich in hazel	2.2	2.2
2000	458	Natural and near-natural old-growth forest	3	3
2000	471	Natural and near-natural old-growth forest	0.5	0.5
2000	515	Natural and near-natural old-growth forest	1.3	1.3
2002	73	Natural and near-natural old-growth forest	4.5	4.5
2002	107	Natural and near-natural old-growth forest	3.2	2.8
2002	108	Natural and near-natural old-growth forest	2.8	2.2
2002	119	Natural and near-natural old-growth forest	2.9	2.6
2003	54	Alder groves rich in vascular plants	0.2	0.2
2003	447	Brooks and small water biotopes with surrounding land	2.1	2.1
2003	563	Calcareous and mineral-rich fens	0.6	0.6
2003	564	Natural and near-natural old-growth forest	2.5	2.5
2004	403	Natural and near-natural old-growth forest	2.8	2.8
2004	404	Natural and near-natural old-growth forest	2	2
2004	405	Natural and near-natural old-growth forest	0.6	0.6
2004	408	Natural and near-natural old-growth forest	1.9	1.9
2004	509	Natural and near-natural old-growth forest	3.6	3.6
2004	510	Natural and near-natural old-growth forest	1.7	1.7

2004	511	Natural and near-natural old-growth forest	1.2	1.2
2004	512	Natural and near-natural old-growth forest	2.8	2.8
2007	6949	Natural and near-natural old-growth forest	3.7	3.7

Nature conservation agreements

Object year	*Object nr*	*Habitat type*	*Ha total*	*Ha forest*
2002	540	Culture landscape, pasture and forest pasture	7.1	7
2003	85	Culture landscape, pasture and forest pasture	8.3	8.3
2003	138	Natural or near-natural deciduous forest	6.3	6.3
2003	139	Culture landscape, pasture and forest pasture	6.7	6.7
2003	140	Natural or near-natural coniferous forest	3.6	2.5
2003	274	Natural or near-natural coniferous forest	13.8	12
2003	566	Culture landscape, pasture and forest pasture	9	9
2004	179	Natural or near-natural deciduous forest	2	2
2004	180	Natural or near-natural deciduous forest	1.4	1.4
2004	181	Buffer zone, corridor, stream, ravine	2.1	2.1
2004	448	Natural or near-natural coniferous forest	4.3	4.3
2005	412	Natural or near-natural coniferous forest	19.3	19.3
2006	619	Natural or near-natural coniferous forest	1.7	1.7
2006	620	Natural or near-natural deciduous forest	1.6	1.6

On behalf of the Swedish Forest Agency

Anders Wiborg
District Manager

Address		Telephone	Org.Reg.Nr.	E-mail
HQ	Vallgatan 8	+46(0)36-35 93 00	202100-5612	skogsstyrelsen@skogsstyrelsen.se
Swedish Forest Agency	Jönköping	Fax	VAT Reg.Nr.	www.skogsstyrelsen.se
551 83 Jönköping		+46(0)36-16 61 70	SE202100561201	

LÄNSSTYRELSEN
VÄSTRA GÖTALANDS LÄN
Naturvårdsenheten
Gunilla Odén
0501-60 54 07

501-82290-2008 Pag 1(3)

2008-08-22

Lake Vänern Archipelago and Mount Kinnekulle
Biosphere Reserve candidate area
Götene Municipality
533 80 Götene

Designated nature reserves, Natura 2000 sites and areas of national interest within the planned Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve

The following area is a designated national park under the Ordinance on National Parks, section 4, in the planned Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve:

Date of decision	***Name***	***Area***
1991-04-11	Djurö	2358

The following areas have been declared nature reserves under the Environmental Code, Chapter 7, section 4 (SFS 1998:808) within the planned Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve:

Date of decision	***Name***	***Area (ha)***
1923-06-26	Kalvsund Storeberg	13
1926-06-05	Lunnelid Råda	4
1972-01-18	Klosterängen	5
1976-02-09	Skansen Läckö	6
1981-08-20	Surö beech forest	20
1981-08-20	Hästhagen	31
1982-09-13	Mount Kinnekulle (nature conservation area)	7 000
1986-09-18	Hindens rev	12
1986-12-15	Kalvö archipelago (nature conservation area)	2190(277)
1987-04-27	Brommö archipelago	955(155)
1987-04-27	Västra Bommö (nature conservation area)	300(86)
1989-01-25	Hindens udde-Svalnäs (nature conservation area)	220(138)
1989-01-25	Parkudden (nature conservation area)	95(60)
1989-01-25	Kålland's archipelagos (nature conservation area)	6500(840)
1993-02-08	Gamla Ekudden	22
1995-09-19	Kedums-Torpa	17
1996-04-29	Lindbergs Domän (Forest Service) reserve	2
1996-05-28	Furunäsudde	3
1996-06-20	Trilleholme-Flatö	6
2001-10-11	Torsängen	3
2002-05-27	Lake Dättern (part of)	3 740
2002-06-24	Västerplana storäng	95
2005-04-15	Onsö	813
2007-06-18	Sandviken	45
2007-08-28	Blomberg	81
2007-08-28	Gamleriket	21

2007-08-28	Såten	117
2007-08-28	Hellekis	21
2007-08-28	Gröne forest	36
2007-08-28	Råbäck oak pastures	16
2007-08-28	Råbäck lake forest	29
2007-08-28	Råbäck	36
2007-09-18	Bestorp	125
2007-09-18	Törnsäter	65
2007-09-18	Munkängarna	76
2007-09-18	Stora Salen	29
2007-09-18	Skagen	99
2007-09-18	Hönsäter lake forest	26
2007-09-18	Djurgården	100
2007-10-22	Eastern and Western Fågelön islands	12
2008-06-10	Österplana hed o vall extension	612
2008-06-10	Halla	60

The following areas have been designated by the Swedish Government, supported by the Environmental Code, Chapter 7, section 28 (SFS 1998:808) as Natura 2000 sites in accordance with the Habitats Directive (pSCI) and the Birds Directive (SPA) within the planned Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve:

Government decision, pSCI	***Government decision, SPA***	***Object nr***	***Name***	***Area (ha) pSCI/SPA***
1995-12-01		SE0540063	Mount Kinnekulle	7124
1995-12-01		SE0540076	Djuröarna	2358
1995-12-01		SE0540077	Brommö archipelago	1260
1995-12-01		SE0540078	Kalvö archipelago	2162
1997-01-01		SE0540107	Fågelöarna	12
1997-01-01		SE0540110	Skansen Läckö	7
1997-01-01		SE0540085	Kålland's archipelagos	6489
1997-01-01		SE0540116	Klosterängen	4
1997-01-01		SE0540101	Gamla Ekudden	26
1997-01-01		SE0540103	Surö beech forest	19
1998-12-01		SE0540206	Mount Minnesfjället	9
1998-12-01		SE0530126	Lake Dättern	3740
2007-07-01		SE0540216	Skebykärret fen	1
2001-06-01		SE0540255	Mariedal	36
2001-06-01		SE0540257	Stensholmen	2
2001-06-01		SE0540258	Kedums-Torpa	19
2001-06-01		SE0540259	Svaneberg-Lilla Myran	30
2001-06-01		SE0540260	Lindbergs Domän (Forest Service) reserve	2
2004-04-01		SE0540319	Sunträlje, Recklan	10
2004-04-01		SE0540320	Per Olofsgården	8
2004-04-01		SE0540321	Hälledal	13
2004-04-01		SE0540328	Baggesten	15
2004-04-01		SE0540292	Drakaberget mountain	29
2004-04-01		SE0540291	Källstorp	48
2004-04-01		SE0540294	Dyrenäs Sjötorp	6
2004-04-01		SE0540295	Hassle Grönebäck	2

The following areas within the planned Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve are of national interest for the purpose of nature conservation in accordance with the Environmental Code, Chapter 3, section 6 and designated by the Swedish Environmental Protection Agency on 28 September 2000:

Decision date	***Identity***	***Name of area***
1988-02-08	FR 04	Kållandsö-Hindens rev-Svalnäs Djurö archipelago, Brommö
1988-02-08	FR 02	Torsö-Fågelö
1988-02-08	FR 03	Göta Canal
1988-02-08	FR 05	Mount Kinnekulle
1996-08-27	KR 015	Björsäter
1996-08-27	KR 016	Mount Lugnåsberget
1996-08-27	KR 017	Mariestad
1996-08-27	KR 018	Karelby
1996-08-27	KR 019	Ek manor
1996-08-27	KR 02	Göta Canal
1996-08-27	KR 07	Eken's archipelago
1996-08-27	KR 08	Otterstad-Läckö
1996-08-27	KR 09	Kålland
1996-08-27	KR 10	Tun
1996-08-27	KR 11	Mount Kinnekulle
1996-08-27	KR 12	Forshem
1996-08-27	KR 13	Ova-Mariedal
1996-08-27	KR 60	Lidköping town
2000-09-28	NR 014031	Djurö archipelago
2000-09-28	NR 014032	Hovden & Västra Brommö
2000-09-28	NR 014033	Kalvöarna islands
2000-09-28	NR 014041	Kålland's archipelago
2000-09-28	NR 014051	Söne-Kedum-Tådene archipelago
2000-09-28	NR 014052	Hjortens udde-Hindens rev-Skalunda
2000-09-28	NR 014053	Parkudden
2000-09-28	NR 014054	Kållandsö island
2000-09-28	NR 014055	Mount Kinnekulle
2000-09-28	NR 014056	Holmestad
2000-09-28	NR 014057	Mount Lugnåsberget
2000-09-28	NR 014068	Lake Dättern and surrounding areas
2000-09-28	NR 014070	Lundsbrunn-Mariedal
1982	National Interests	Lake Vänern (in accordance with the Environmental Code, chapter 4)
1974	Ramsar site	Lake Dättern

Gunilla Odén
Cc: MT

Appendix 5a. List of management plans

LÄNSSTYRELSEN
VÄSTRA GÖTALANDS LÄN

Naturvårdsenheten
Gunilla Odde
0501-60 54 07

2008-08-22

501-82290-2008

Biosfärkandidatområdet Vänerskärgården med Kinnekulle
Götene kommun
533 80 Götene

Förteckning över beslutade skötselplaner för nationalparken samt för naturreservaten inom det planerade biosfärområdet Vänerskärgården med Kinnekulle

Nationalpark	*Reservatsbeslut*	*Skötselplanebeslut*
Djurö	1991-04-11	1991-02-07
Naturreservat	***Reservatsbeslut***	***Skötselplanebeslut***
Kalvsund Storeberg	1923-06-26	Saknas
Lunnelid Råda	1926-06-05	2006-03-13
Klosterängen	1972-01-18	2003-11-07
Skansen Läckö	1976-02-09	1975-10-23
Surö bokskog	1981-08-20	2002-12-16
Hästhagen	1981-08-20	2003-10-31
Kinnekulle (naturvårdsområde)	1982-09-13	1982-09-13
Hindens rev	1986-09-18	1986-09-18
Kalvö skärgård (naturvårdsomr)	1986-12-15	1986-12-15
Brommö skärgård	1987-04-27	1987-04-27
Västra Brommö (naturvårdsomr)	1987-04-27	1987-04-27
Hindens udde-Svalnäs (naturvårdsområde)	1989-01-25	1998-01-25
Parkudden(naturvårdsområde)	1989-01-25	1998-01-25
Kållands skärgårdar(naturvårdsområde)	1989-01-25	1998-01-16
Gamla Ekudden	1993-02-08	1992-11-02
Kedums-Torpa	1995-09-19	1995-09-19
Lindbergs domänreservat	1996-04-29	1996-04-29
Furunäsudde	1996-05-28	1996-05-28
Trilleholme-Flatö	1996-06-20	1996-06-20
Torslingen	2001-10-11	1998-12-21
Dättern del av	2002-05-27	1998-10-15
Västerplana storäng	2002-06-24	2002-06-18
Omö	2005-04-15	2005-04-06
Sandviken	2007-06-18	2007-04-20
Blomberg	2007-08-28	2007-08-28
Gamlerket	2007-08-28	2007-08-28
Säter	2007-08-28	2007-08-28
Hellekis	2007-08-28	2007-08-28
Gröne skog	2007-08-28	2007-08-28
Råbäcks ekhagar	2007-08-28	2007-08-28
Råbäcks sjöskog	2007-08-28	2007-08-28
Råbäck	2007-08-28	2007-08-28

Postadress: 542 85 MARIESTAD | Besöksadress: Hamngatan 1 | Telefon/Fax: 0501-60 50 00 (växel) 0501-60 54 40 (fax) | Webbadress: www.o.lst.se | E-post: natur@o.lst.se

Bestorp	2007-09-18	2007-09-18
Tömmåter	2007-09-18	2007-09-18
Munkängarna	2007-09-18	2007-09-18
Stora Salen	2007-09-18	2007-09-18
Skagen	2007-09-18	2007-09-18
Hönestens sjöskog	2007-09-18	2007-09-18
Djurgården	2007-09-18	2007-09-18
Östra och Västra Fågelön	2007-10-22	2007-10-22
Österplana hed o vall utvidg	2008-06-10	2008-06-10
Halla	2008-06-10	2008-06-10

Gunilla Odén

Kopia till:
MT

Appendix 5b. Translation of list of management plans.

LÄNSSTYRELSEN
VÄSTRA GÖTALANDS LÄN
Naturvärdsenheten
Gunilla Odén
0501-60 54 07

501-82290-2008 Page
2008-08-22 1(2)

Lake Vänern Archipelago and Mount Kinnekulle
Biosphere Reserve candidate area
Götene Municipality
533 80 Götene

List of management plans agreed for the national park and for the nature reserves within the planned Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve * (NCA = Nature Conservation Area)

National park	***Reserve decision***	***Management plan decision***
Djurö	1991-04-11	1991-02-07
Nature reserve	***Reserve decision***	***Management plan decision***
Kalvsund Storeberg	1923-06-26	Not applicable
Lunnnelid Råda	1926-06-05	2006-03-13
Klosterängen	1972-01-18	2003-11-07
Skansen Läckö	1976-02-09	1975-10-23
Surö beech forest	1981-08-20	2002-12-16
Hästhagen	1981-08-20	2003-10-31
Mount Kinnekulle (NCA)	1982-09-13	1982-09-13
Hindens rev	1986-09-18	1986-09-18
Kalvö archipelago (NCA)	1986-12-15	1896-12-15
Brommö archipelago	1987-04-27	1987-04-27
Västra Brommö (NCA)	1987-04-27	1987-04-27
Hindens udde-Svalnäs (NCA)	1989-01-25	1998-01-25
Parkudden (NCA)	1989-01-25	1998-01-25
Kålland's archipelagos (NCA)	1989-01-25	1998-01-16
Gamla Ekudden	1993-02-08	1992-11-02
Kedums-Torpa	1995-09-19	1995-09-19
Lindbergs Domän reserve	1996-04-29	1996-04-29
Furunäsudde	1996-05-28	1996-05-28
Trilleholme-Flatö	1996-06-20	1996-06-20
Torsängen	2001-10-11	1998-12-21
Lake Dättern part of	2002-05-27	1998-10-15
Västerplana storäng	2002-06-24	2002-06-18
Onsö	2005-04-15	2005-04-06
Sandviken	2007-06-18	2007-04-20
Blomberg	2007-08-28	2007-08-28
Gamleriket	2007-08-28	2007-08-28
Såten	2007-08-28	2007-08-28
Hellekis	2007-08-28	2007-08-28
Gröne skog	2007-08-28	2007-08-28
Råbäck oak pastures	2007-08-28	2007-08-28
Råbäck lake forest	2007-08-28	2007-08-28
Råbäck	2007-08-28	2007-08-28

Bestorp	2007-09-18	2007-09-18
Törnsäter	2007-09-18	2007-09-18
Munkängarna	2007-09-18	2007-09-18
Stora Salen	2007-09-18	2007-09-18
Skagen	2007-09-18	2007-09-18
Hönsäter lake forest	2007-09-18	2007-09-18
Djurgården	2007-09-18	2007-09-18
Eastern and Western Fågelö	2007-10-22	2007-10-22
Österplana hed & vall ext.	2008-06-10	2008-06-10
Halla	2008-06-10	2008-06-10

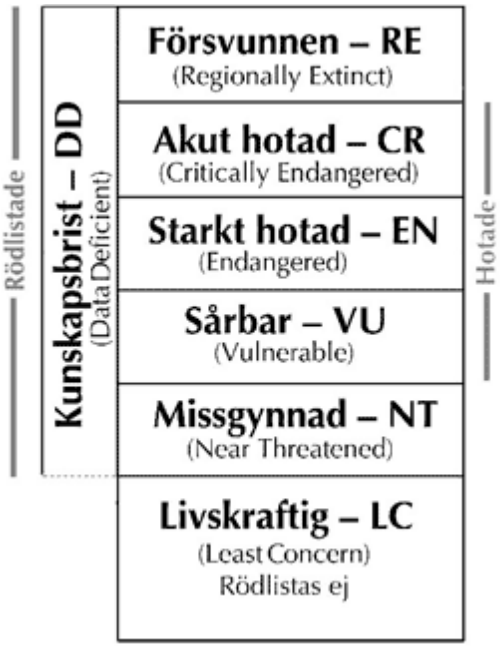
Gunilla Odén
Cc:MT

Appendix 6. Species list

Species from the national red list, species from the EU Bird and Habitats directives, and species from the global red list

Redlisted species in Sweden 2005

The red list is a list of threatened and near-threatened plants, fungi and animals. Information on redlisted species in Sweden is collected and compiled by the Swedish Species Information Centre (ArtDatabanken). Since 2005, new red list categories are used in Sweden, based on the IUCN Red List. ArtDatabanken has adapted the categories to regional level, the so called Swedish red list.



Species classified as either *Data Deficient (DD), Regionally Extinct (RE), Critically Endangered (CR), Endangered (EN), Vulnerable (VU)* or *Near Threatened (NT)* are *redlisted*. Redlisted species that are classified as either *Critically Endangered (CR), Endangered (EN)* or *Vulnerable (VU)* area *threatened*.
English abbreviations are used to facilitate comparisons with other countries.

The category *Data Deficient (DD)* covers all red-listed categories and includes species that would most probably belong to any category from *Regionally Extinct (RE)* to *Near Threatened (NT)* and in a few cases even *Least Concern (LC).*

EU- listed species

The Birds and Habitats directives form the cornerstone of Europe's nature conservation policy. The Birds Directive covers all naturally occurring wild birds in Europe and the Habitats Directive covers natural habitats and wild flora and fauna in Europe. The directives require the protection of species as well as their habitats. The general aim of the Habitats Directive is to secure favourable conservation status for certain species and habitats. The species must be ensured long-term survival in their natural habitats and must not be decimated. The number of such habitats must also be sufficient to safeguard a future population growth. The general aim of the Birds Directive is to maintain the populations of certain birds at a level which corresponds to their ecological, scientific and cultural requirements.

Appendix 6c lists the species within the proposed biosphere reserve that are included in the EU Habitats and Birds directives.

Species on the global red list

The International Union for the Conservation of Species (IUCN) is a global organisation for nature conservation and the environment. The global Red List is up-dated every year, and in

2007 the list comprised more than 41,000 species, of which 16,000 were critically endangered.

Species within the proposed biosphere reserve that are listed on the global 2007 IUCN Red List of threatened species.

Group	Latin name	English common name	Category
Beetles	*Buprestis splendens* *Osmoderma eremita*	Goldstreifiger Hermit beetle	VU
Hymenop-terons	*Formica rufa*	Southern wood ant	LR (nt)
Butterflies and moths	*Parnassius apollo*	Apollo	VU
	Phyllodesma ilicifolia	Small lappet	VU
	Maculinea arion	Large blue	LR (nt)
Crusta-ceans	*Astacus astacus*	Noble crayfish	VU
Leeches	*Hirudo medicinalis*	Medical leech	LR (nt)
Molluscs	*Vertigo geyeri* *Vertigo angustior* *Vertigo genesii*	Geyer's whorl snail Narrow-mouthed whorl snail Round-mouthed whorl snail	LR (cd) LR (cd) LR (cd)
Birds	*Crex crex*	Corncrake	NT
Fishes	*Lampetra fluviatilis* *Lampetra planeri*	River lamprey Brook lamprey	LR (nt) LR (nt)
Mammals	*Barbastella barbastellus* *Myotis dasycneme*	Barbastelle bat Pond bat	VU
	Castor fiber *Lutra lutra* *Sciurus vulgaris*	Beaver Otter Red squirrel	NT
	Muscardinus avellanarius	Hazel dormouse	LR (nt)

Species within the proposed biosphere reserve that are listed in the EU Birds and Habitats directives

Group	Latin namne	English common name
Birds	*Bubo bubo*	Eagle owl
	Pernis apivorus	Honey buzzard
	Circus aeruginosus	Marsh harrier
	Philomachus pugnax	Ruff
	Pandion haliaetus	Osprey
	Sterna hirundo	Common tern
	Tringa glareola	Wood sandpiper
	Haliaeetus albicilla	White-tailed eagle
	Asio flammeus	Short-eared owl
	Bonasa bonasia	Hazel grouse
	Crex crex	Cornkrake
	Alcedo atthis	Kingfisher
	Ficedula parva	Red-breasted flycatcher
	Caprimulgus europaeus	Nightjar
	Tetrao tetrix	Black grouse
	Emberiza hortulana	Ortolan bunting
	Falco peregrinus	Peregrine
	Aegolius funereus	Tengmalm's owl
	Botaurus stellaris	Bittern
	Sterna paradisea	Arctic tern
	Sterna caspia	Caspian tern
	Porzana porzana	Little crake
	Glaucidium paserinum	Pygmy owl
	Dryocopus martius	Black woodpecker
	Gavia arctica	Black-throated diver
	Podiceps auritus	Slavonian grebe
	Tetrao urugallus	Capercaillie
	Grus grus	Crane
	Picoides tridactylus	Three-toed woodpecker
	Lullula arborea	Woodlark
	Lanius collurio	Red-backed shrike
	Branta leucopsis	Barnacle goose
	Circus pygargus	Montagu's harrier
Vascular plants	*Cypripedium calceolus*	Lady's slipper
	Persicaria foliosa	Smartweed
Mosses	*Buxbaumia viridis*	Green shield-moss
	Tortella rigens	Tortella moss
Beetles	*Osmoderma eremita*	Hermit beetle
Pseudoscorpions	*Anthrenochernes stellae*	No common English name found
Molluscs	*Vertigo geyeri*	Geyer's whorl snail
	Vertigo angustior	Narrow-mouthed whorl snail
	Vertigo genesii	Round-mouthed whorl snail
Mammals	*Barbastella barbastellus*	Barbastelle bat
	Myotis dasycneme	Pond bat
	Lutra lutra	Otter
Reptiles and amphibians	*Triturus cristatus*	Great crested newt
Fishes	*Aspius aspius*	Asp
	Salmo salar	Salmon(freshwater)
	Cobitis taenia	Spined loach
	Coergonus oxyrhynchus	Houting
	Cottus gobio s.lat.	Bullhead

Species noted to date within the proposed biosphere reserve that are listed on the national red list according to the Swedish Species Information Centre in the categories Endangered (EN), Vulnerable (VU) and Critically Endangered (CR).

Group	Latin name	English common name	Category
Vascular plants	*Alyssum alyssoides*	Small alison	VU
	Botrychium matricariifolium	Daisyleaf grape fern	
	Botrychium virginianum	Rattlesnake fern	
	Bromopsis benekenii	Lesser hairy-brome	
	Camelina microcarpa	Lesser gold-of-pleasure	
	Carex hartmanii	Hartman's sedge	
	Carex pulicaris	Flea sedge	
	Catabrosa aquatica	Whorl-gass	
	Centaurium erythraea	Common centaury	
	Chimaphila umbellata	Umbellate wintergreen	
	Drymocallis rupestris	Rock cinquefoli	
	Euphrasia micrantha	Northern eyebright	
	Galium triflorum	Fragrant bedstraw	
	Gentiana pneumonanthe	Marsh gentian	
	Gentianella campestris	Field gentian	
	Gymnocarpium robertianum	Limestone fern	
	Herminium monorchis	Musk orchid	
	Lathyrus tuberosus	Tuberous pea	
	Malva pusilla	Small mallow	
	Microstylis monophyllos	One-leaved bog orchid	
	Persicaria foliosa	Smartweed	
	Radiola linoides	Allseed	
	Stachys arvensis	Field woundwort	
	Taraxacum decolorans	Chalkland dandelion	
	Taraxacum litorale	Shore dandelion	
	Taraxacum praestans	Distinguished dandelion	
	Thymus pulegioides	Large thyme	
	Arenaria gothica	Limestone sandwort	EN
	Bidens radiata	Greater bur-marigold	
	Bromus commutatus	Meadow brome	
	Bromus secalinus	Rye brome	
	Cardamine parviflora	Sand bittercress	
	Chenopodium murale	Nettle-leaved goosefoot	
	Dracocephalum ruyschiana	Northern dragonhead	
	Gypsophila muralis	Low baby's breath	
	Hypericum humifusum	Trailing St John's-wort	
	Misopates orontium	Weasel's-snout	
	Nepeta cataria	Catmint	
	Orobanche reticulata	Thistle broomrape	
	Polystichum aculeatum	Hard shield-fern	
	Potamogeton acutifolius	Sharp-leaved pondweed	
	Taraxacum vestrogothicum	No common English name found	
	Verbascum lychnitis	White mullein	
Algae	*Nitella gracilis*	Slender stonewort	EN

Mosses	*Calypogeia suecica*	Swedish pouchwort	VU
	Didymodon spadiceus	Brown beard moss	
	Didymodon vinealis	Soft-tufted beard moss	
	Entosthodon obtusus	Blunt cord moss	
	Eurhynchium striatulum	Lesser striated feather moss	
	Hookeria lucens	Shining lookeria	
	Orthotrichum patens	No common English name found	
	Paraleucobryum sauteri	No common English name found	
	Pterogonium gracile	Bird's foot wing moss	
	Riccia huebeneriana	Violet crystalwort	
	Scapania brevicaulis	No common English name found	
	Seligeria calcarea	Small limestone moss	
	Tetrodontium ovatum	Ovate tetrodontium moss	
	Tritomaria exsecta	Cut notchwort	
	Ulota coarctata	Club pincushion	
	Didymodon sinuosus	Wavy beard moss	EN
	Rhynchostegiella teneriffae	Teesdale feather moss	
Macrofungi	*Hapalopilus croceus*	No common English name found	CR
	Hericium erinaceus	Bearded tooth	
	Rhodotus palmatus	Wrinkled peach	
	Cortinarius caerulescens	Mealy bigfoot webcap	EN
	Cortinarius polymorphus	No common English name found	
	Cortinarius prasinocyaneus	No common English name found	
	Cortinarius prasinus	No common English name found	
	Cortinarius sodagnitus	Bitter bigfoot webcap	
	Cortinarius variiformis	No common English name found	
	Elasmomyces krjukowensis	No common English name found	
	Entoloma kervernii	No common English name found	
	Entoloma roseum	Rosy pinkgill	
	Hygrocybe ovina	Blushing waxcap	
	Hygrophorus arbustivus	No common English name found	
	Hypochnella violacea	No common English name found	
	Inocybe fibrosa	Silky firbrecap	
	Inonotus dryadeus	Oak bracket	
	Leccinum crocipodium	Saffron bolete	
	Lepiota hystrix	No common English name found	
	Lepiota jacobi	No common English name found	
	Oligoporus balsameus	No common English name found	
	Phellodon confluens	Fused tooth	
	Piptoporus quercinus	Oak polypore	
	Porpoloma pes-caprae	No common English name found	
	Tulostoma niveum	White stalkball	

	Amanita franchetii	No common English name found	VU
	Boletopsis leucomelaena	Black falsebolete	
	Boletus fechtneri	Pale bolete	
	Boletus impolitus	Iodine bolete	
	Camarophyllopsis atropuncta	Dotted fanvault	
	Clavariadelphus helveticus	Rodnande klubbsvamp	
	Cortinarius alcalinophilus	No common English name found	
	Cortinarius arcuatorum	No common English name found	
	Cortinarius aureofulvus	No common English name found	
	Cortinarius aureopulverulentus	No common English name found	
	Cortinarius bulliardii	Hotfoot Webcap	
	Cortinarius caerulescentium	No common English name found	
	Cortinarius caesiocortinatus	No common English name found	
	Cortinarius caesiogriseus	No common English name found	
	Cortinarius cageii	No common English name found	
	Cortinarius camptoros	No common English name found	
	Cortinarius corrosus	No common English name found	
	Cortinarius croceocoeruleus	No common English name found	
	Cortinarius flavovirens	No common English name found	
	Cortinarius fuscoperonatus	No common English name found	
	Cortinarius pseudoglaucopus	No common English name found	
	Cortinarius quercilicis	No common English name found	
	Cortinarius saporatus	No common English name found	
	Cortinarius terpsichores	No common English name found	
	Cystolepiota adulterina	No common English name found	
	Entoloma madidum	No common English name found	
	Entoloma tjallingiorum	No common English name found	
	Flammulina fennae	No common English name found	
	Hydnellum auratile	Gold tooth	
	Hygrocybe ingrata	No common English name found	
	Hygrocybe intermedia	Fibrous waxcap	
	Hygrocybe spadicea	Date waxcap	
	Hygrophorus gliocyclus	No common English name found	
	Inocybe tricolor	No common English name found	
	Lepiota ochraceofulva	No common English name found	
	Lycoperdon mammiforme	No common English name found	
	Oligoporus guttulatus	No common English name found	
	Russula laeta	No common English name found	
	Russula rutila	No common English name found	
	Sarcodon scabrosus	Bitter tooth	
	Steccherinum robustius	No common English name found	
	Tricholoma atrosquamosum	Dark scaled knight	
	Tricholoma orirubens	No common English name found	
	Tyromyces fissilis	No common English name found	
	Tyromyces wynnei	No common English name found	
	Volvariella bombycina	Silky rosegill	
	Geoglossum atropurpureum	Dark-purple earthtongue	
	Hypoxylon vogesiacum	No common English name found	
	Sowerbyella radiculata	No common English name found	
Beetles	*Allecula rhenana*	No common English name found	EN
	Carabus convexus	No common English name found	VU
	Liodopria serricornis	No common English name found	
Butterflies and moths	*Cochylidia richteriana*	No common English name found	EN
	Digitivalva arnicella	No common English name found	EN
	Dyscia fagaria	Grey scalloped bar	EN
	Elachista tetragonella	No common English name found	EN
	Maculinea arion	Large blue	VU
	Pyrgus alveus	Large grizzled skipper	VU
Crustaceans	*Astacus astacus*	Noble crayfish	EN

Reptiles	*Coronella austriaca*	Smooth snake	VU
Fishes	*Anguilla anguilla*	Eel	CR
	Salmo salar (Gullspångspopulationen)	Gullspång salmon	EN
	Aspius aspius	Asp	VU
Birds	*Circus pygargus*	Montagu's harrier	EN
	Pernis apivorus	Honey buzzard	
	Alcedo atthis	Kingsfisher	VU
	Anas querquedula	Garganey	
	Caprimulgus europaeus	Nightjar	
	Crex crex	Cornkrake	
	Emberiza hortulana	Ortolan bunting	
	Falco peregrinus	Peregrine	
	Larus fuscus	Lesser black-backed gull	
	Philomachus pugnax	Ruff	
	Picoides tridactylus	Three-toed woodpecker	
	Podiceps auritus	Slavonia grebe	
	Porzana porzana	Spotted crake	
	Sterna caspia	Caspian tern	
	Streptopelia decaocto	Collared dove	
	Locustella fluviatilis	River warbler	
	Remiz pendulinus	Penduline tit	
Mammals	*Barbastella barbastellus*	Barbastelle bat	EN
	Lutra lutra	Otter	VU
	Myotis mystacinus	Whiskered bat	
	Myotis nattereri	Natterer's bat	

Appendix 7. List of main bibliographic references

Ahlberg, J 1990: *Sjökapten Jacob Ahlberg: Från stormande hav till lugna Vänervikar.*

Ahlgren, M 1999: *En bit av Västergötland: anteckningar 1970-95*.

Andersson, R & Rask, K 1984: *Lurö: Ön i Vänerns mitt*.

Axelsson, I 2001: *Brommö: en studie av ön från urminnes tider till nutid, efter synnerligen eget huvud*.

Backman, C; Gunnarsson, A & Karlsson, H 2001: Kring Vänern, Vänermuseet.

Beckman, M 2003: *Inför restaureringen av alvarmark på Kinnekulle, en undersökning av kärlväxtfloran efter en lång period av ohävd.* Botaniska institutionenm, Göteborgs Universitet.

Bengtsson, S 1988: *Skatter i Skaraborg*.

Berglund, A 2004: *Arkeologisk forskning kring Husaby biskopsborg*, Götene kommun, Rapport nr: Raä 18.

Bjäre, E 1979: *Lasse i Berget: Historien om den märklige jägaren och grottmänniskan i Husaby*.

Ekeland, K & Sturegård, R 1985: *Lugnåsberget, Historisk markanvändningsstudie*, Riksantikvarieämbetet – vårdsektionen.

Fogelberg, T 1967: *Bromö glasbruk 1803-1879*.

Granath, S 1996: *Från Ullersbro till Läckö: berättelser från det gamla Kållandsö*.

Gustafsson, K J 2001: *Runstenar och ridvägar i Västergötland*.

Gustafsson, K J 2004: *Mera om runstenar och ridvägar i Västergötland*.

Gustavsson, E 2007: *Grassland Plant Diversity in Relation to Historical and Current Land Use*, Swedish University of Agricultural Sciences.

Göthberg, E 2003: *Kulturhistoriskt värdefulla byggnader och miljöer i Mariestads kommun*, Västergötlands museum och Mariestads kommun.

Hallbäck, S A 1978: *Vänerns stränder.*

Hallberg, S 1983: *Vänerfartygen: från segelskutan till dieselmotorfartyget*.

Hallberg, S 1986: *Lots och leder i Trollhättekanal och Vänern: Vänersjöfartens utveckling*.

Hallberg, S 1993: *Vattenvägen till Vänerland: Vänersjöfartens utveckling*.

Hallin, K 1980: *Götene kommun, Översiktlig kulturhistorisk inventering,* Skaraborgs läns museum.

Hasselkvist, U 1982: *Översiktlig bebyggelseinventering i Lidköpings kommun 1981, Centralorten,* Lidköpings hantverks och sjöfartsmuseum.

Holmström, E 1984: *Otterstad, Strö, Sunnersberg, Kulturhistorisk bebyggelseinventering 1981-1984 i Lidköpings kommun,* Lidköpings hantverks och sjöfartsmuseum.

Holmström, E 1989: *Bygd i arv, vilja-våga-vårda, underlag för ÖP i Lidköpings kommun,* Lidköpings hantverks och sjöfartsmusem.

Holmström, E 1990: *Kulturmiljöinventering i Lidköpings stadskärna,* Lidköpings hantverks och sjöfartsmuseum.

Holmström, E 2000: *Vänerns fyrar - lysande kulturhistoria: en bok om Vänerns fyrar och deras kulturmiljö.*

Hult, B 1993: *Från Tuna till Tunaholm.*

Jansson, H & Jansson, I 1985: *Skeby sockenbok,* Skeby Sockengille.

Johansson, B 1998: *I Luröfiskarnas vatten.*

Julihn, E 1979: *Industriminnen i Götene kommun*.

Knutsson, L-I & Larsson, H 1996: *Götene genom tiderna.* Götenes födelse och utveckling fram till senare delen av 30-talet.

Kongbäck, H m.fl. 2006: *Vänerhavet,* Vänerhavet HB.

Lundqvist, L & Stibéus, M 1999: *Aranaesborgen: arkeologisk undersökning 1999: en förstudie kring en medeltida borg i Västergötland.*

Möller, A 2003: *När stormens rytande har tystnat: En bok om fartygshaverier och förlisningar på Vänern*.

Nylén, K 1991: *Vänern runt på egen köl: en resa i ord och bild*.

Pettersson, O 1986: *Biskopsborgen i Husaby: en medeltida anläggning på Kinnekulle.*

Rosengren, L 2001: *Jord och folk: Om produktiva resurser i västsvens blandbygd under 1700-talet.*

Schnell, J-B 2001: *Palatset som blev en borg: Husaby biskopsborg på Kinnekulle*.

Svärdström, E 1958: *Västergötlands runinskrifter 3: Skaraborgs läns runstenar*.

Söderskog, W 1964: *Från Vänern till Oceanerna: en bok om Axel och Dan Boström.*

Tjäder, A & Hallgren C 2001: *Bygden kring berget: Kinnekulle under 1000 år*.

Tropp, B 2005: *Mariestad: arbete och liv 1850-2000,* Mariestads kommun.

Westerdal, C 2003: *Vänern: landskap, människa, skepp.* Om en maritim inlandskultur vid Vänern.

Åhlén, M 1991: *Runinskrifter i Skaraborgs Län*.

Agrarhistorisk landskapsöversikt för Västergötland och Dalsland. Länsstyrelsen i Västra Götalands län, Rapport nr: 2002:14.

Alger som fastnar på fisknät i Vänern, Mälaren och Hjälmaren. Vänerns vattenvårdsförbund. Rapport nr 14, 2000.

Att bygga besöksanläggningar i naturen, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:48.

Bebyggelsestudier på Kinnekulle – Studiecirkeln som metod för utvärdering och beskrivning av kulturhistoriska värden, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:85.

Bebyggelsestudier på Kållandsö – Studiecirkeln som metod för utvärdering och beskrivning av kulturhistoriska värden, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:84.

Bekämpningsmedelsrester i yt- och grundvatten i Vänerns avrinningsområde. Vänerns vattenvårdsförbund. Rapport nr 19, 2001.

Brännebrona Malmen förr och nu, Holmestads Hembygdsförening, 1985.

Bullermätningar i Vänerskärgården vid Kållandsö och Hovden. Vänerns vattenvårdsförbund, Rapport nr 45, 2006.

Byggnadsminnen i Skaraborgs Län 1961-1988, Riksantikvarieämbetet, 1989.

De stora sjöarna, Svenska turistföreningen, 1990.

Digitalisering av kommunala kulturmiljövårdsområden, Länsstyrelsen i Västra Götalands län, Rapport nr 2005:03.

Dvärgmusen i Västra Götaland - Populationsundersökningar 1985-2002, Länsstyrelsen i Västra Götalands län, Rapport nr 2004:32.

Dyngbaggar i Västra Götalands län, Länsstyrelsen i Västra Götalands län, Rapport nr 2008:09.

Ekoturistdestination Vänerskärgården med Kinnekulle 2012, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:73.

Embryonal utveckling hos vitmärla i fyra sjöar - Vänern, Vättern, Vågsfjärden och Rogsjön. Vänerns vattenvårdsförbund m.fl. 1999. Rapport nr 8, 1999.

En återinvetnering av rikkärr i Skaraborg. – Länsstyrelsen i Västra Götalands län, Rapport nr 1998:2.

Fladdermöss i Västra Götalands län år 2001, Länsstyrelsen i Västra Götalands län, Rapport nr 2002:48.

Forshem- Fullösa Hembygdsförenings årsskrifter.

Framtidsplan för Götene kommun, Översiktsplan 2004, Götene kommun, 2004.

Friställning av gamla lövträd – råd och riktlinjer, Länsstyrelsen i Västra Götalands län.

Fullösa del I, II och III, dokumentation av historia och nutid.

Fågelinventeringen 2004. Vänerns vattenvårdsförbund, 2004.

Fågelskyddsområden i Vänern, Västra Götalands län – Förslag till revidering, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:12.

Fågelskyddsområden i Vänern, Västra Götalands län: förslag till revidering; område: Brommö - Kalvö skärgårdar. Länsstyrelsen Västra Götalands län; 2007:17.

Fågelskär i Vänern 2001-2003. Vänerns vattenvårdsförbund. Rapport nr 30, 2004.

Fågelskär i Vänern 2000. Vänerns vattenvårdsförbund. Rapport nr 17, 2000.

Fågelskär i Vänern 1999. Inventering av fågelskär i Vänern 1999. Vänerns vattenvårdsförbund, Rapport nr 9, 2000.

Fågelskär i Vänern. Inventering av fågelskär i Vänern 1998. Länsstyrelsen i Västra Götalands län, Rapport 1999:13.

Förändringar av strandnära vegetation runt Vänern. Metodutveckling och analys, Vänerns vattenvårdsförbund, Rapport nr 31, 2004.

Förändringar av strandnära vegetation runt Vänern. – metodutveckling och analys – Vänerns vattenvårdsförbund. Rapport nr 3, 2004.

Grova träd på Kinnekulle - resultan från trädkarteringen 2002-2004, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:13.

Guide to Kinnekulle, Man, nature and the landscape, County Administrative Board of Västra Götaland, Report no: 2007:46. www.kinnekullenatur.se

Gårdar i Västergötland – en bebyggelsehistorisk översikt, Länsstyrelsen i Västra Götalands län, Rapport nr 2004:36.

Hagar i Skaraborg år 2001. En inventering med miljövervakningssyfte. – Länsstyrelsen i Västra Götalands län. Meddelande 2003:15.

Holmestad förr och nu, Holmestads Hembygdsförening, 1990.

Hur påverkade är Friaåns och Tidans åmynningar och finns naturvärdena kvar? En studie av två vattendrag vid Vänerns sydöstra strandlinje 2006. Länsstyrelsen i Västra Götalands län, Rapport nr 2006:70.

Husaby Hembygdsförenings årsskrifter.

Hållbart resande för besöksnäringen i biosfärkandidatområdet Vänerskärgården med Kinnekulle. Länsstyrelsen i Västra Götalands län, Rapport nr 2007:70.

Industriminnen i Mariestads kommun – en inventering utförd 1977, Länsstyrelsen i Skaraborgs län, 1977.

Inventering av ekar och grova lövträd i Lunnelids naturreservat, Länsstyrelsen i Västra Götalands län, Rapport nr 2004:63.

Inventeringen av fågelskär i Vänern 2001. Vänerns vattenvårdsförbund, 2002.

*Inventering av guckusko (*Cypripedium calceolus*) på lokalen vid Hjälmsäter, Kinnekulle,* Länsstyrelsen i Västra Götalands län, Rapport nr 2007:31.

Inventering av kransalger i sötvatten 2007, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:91.

Inventering av rikkärr i Västra Götalands län 2004, Länsstyrelsen i Västra Götalands län, Rapport nr 2005:55.

Inventering av sandödla, (Lacerta agilis), *i Västra Götalands län 2006-2007,* Länsstyrelsen i Västra Götalands län, Rapport nr. 2007:86.

Inventering av skyddsvärda träd i skyddade områden i Västra Götalands län, Länsstyrelsen i Västra Götalands län, Rapport nr 2006:61.

Inventering av undervattensväxter i Vänern 2003. Vänerns vattenvårdsförbund. Rapport nr 35, 2005.

Kinnekulle Plateau Mountain – Restoration & Conservation, An insight into the LIFE project 2002-2007. Länsstyrelsen i Västra Götalands län, Report no: 2008:46.
www.kinnekullenatur.se

Kring Vänern- en vägvisare till kultr och natur, Vänermuseet 2001.

Kväve och fosfor till Vänern och Västerhavet. Transporter, retention och åtgärdsscenarier inom Göta älvs avrinningsområde. Vänerns vattenvårdsförbund, Rapport nr 29, 2004.

Kållandsö - Ett rikt och levande landskap, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:65.

Landskapshistorisk inventering utförd av Klas Tolin, SLU (opubl.).

Life on lakes Vänern, Vättern och Mälaren – A Tale of Nature and Environment. Vänerns vattenvårdsförbund publikation 20, Vätternvårdsförbundet, Mälarens vattenvårdsförbund, Naturvårdsverket och Fiskeriverket 2002.

Livet vid Vänern, Vättern och Mälaren – en berättelse om natur och miljö. Vänerns vattenvårdsförbund Rapport nr 20, Vätternvårdsförbundet, Mälarens vattenvårdsförbund, Naturvårdsverket och Fiskeriverket 2002.

Lövskogar i Mariestads kommun. – Mariestads kommun och Länsstyrelsen i Västra Götalands län. Rapport nr 2001:53.

Lövskogsinventering Götene kommun. – Länsstyrelsen i Västra Götalands län, Rapport nr2000;10.

Lövskogsinventering 2005 – Lidköpings kommun, Länsstyrelsen i Västra Götalands län och Lidköpings kommun, Rapport nr 2005:8.

Manual Naturguidning på Kinnekulle, Länsstyrelsen i Västra Götalands län, 2005. www.kinnekullenatur.se

Mariestad – Vision 2015, Översiktplan 2003, Mariestads kommun, 2003.

Metaller och stabila organiska ämnen i Vänerfisk 1996/-97. Vänerns vattenvårdsförbund, 1998. Rapport nr 5 1998.

Metodbeskrivning för inventering av kolonihäckande sjöfåglar i Vänern. Vänerns vattenvårdsförbund. Rapport nr 28, 2004.

Mil- och andra stenar, 1998.

Miljögifter i fisk 2001/2002. Vänerns vattenvårdsförbund rapport nr 25, Vätternvårdsförbundet och Naturvårdsverket, 2003.

Miljögifter i Vänern - Vilka ämnen bör vi undersöka och varför? Utgiven av IVL rapport B1600 och Vänerns vattenvårdsförbund. Rapport nr 34, 2004.

Naturinventering av Djurö skärgård, Länsstyrelsen i Västra Götalands län, Rapport nr 1976:10.

Naturreservat i Västra Götalands län. Kinnekulle (reservatsfolder på svenska, engelska och tyska), Länsstyrelsen i Västra Götalands län, 2007.

Naturreservat Kinnekulle, Karta, Länsstyrelsen i Västra Götalands län.

Naturvårdsplan 2006 – Mariestads kommun, 2006.

Om laxar, sjöormar, galärskepp… i Vänern. Vänerns vattenvårdsförbund. Rapport nr 21, 2002.

Platåberget Kinnekulle – restaurering & bevarande. En inblick i LIFE-projektet 2002 – 2007, Länsstyrelsen i Västra Götalands län, Rapport nr 2008:46. www.kinnekullenatur.se

Program för samordnad nationell miljöövervakning i Vänern. Vänerns vattenvårdsförbund. Rapport nr 10, 2000.

Sammanställning av inventering av läderbagge (Osmoderma eremita) *på Kinnekulle åren 2002 och 2005,* Länsstyrelsen i Västra Götalands län, 2007.

Sammanställning av inventering av törnskata (Lanius collurio) *i gräsmarker som restaurerats inom Life-projektet Kinnekulle,* Länsstyrelsen i Västra Götalands län, 2007.

Sammanställning av inventering av vegetation i restaurerade kalkgräsmarker på Kinnekuller, år 2004 och 2006, Länsstyrelsen i Västra Götalands län. 2007.

Segelbara inlandsfarvatten, Svensk Lots 4, 1972.

Skaraborgsnatur 2005, Årsskrift för Skaraborgs naturskyddsförening, 2005.

Skeby Hembygdsförenings årsskrifter.

Skeppsbrott: vrak i Vänersjö, Vänermuseet i Lidköping, 1998.

Skolor inom Holmestad, Kinne-Vedum, Vättlösa, dokumentation över skolor som funnits i bygden, 1996.

Skötsel av fågelskär i Vänern – Skötselobjekt och skötselråd för Götene, Lidköpings och Mariestads kommun. Rapport nr 48. Vänerns vattenvårdsförbund och Länsstyrelsen Västra Götalands län 2007.

Strategi för övervakning av biologisk mångfald i Västra Götaland, Länsstyrelsen i Västra Götalands län, Rapport nr 2004:48.

Större vattensalamandrar (Triturus cristatus) *i några dammar på Kinnekulle,* Länsstyrelsen i Västra Götalands län, Rapport nr 2007:13.

Svartfläckig blåvinge i Västra Götalands län, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:54.

Sveriges inre vattenvägar 4, Yngve Rollof, 1981.

Sveriges öar, Anders Källgård, 2005.

Sägner och berättelser från Kållands härad och Vänern, Christer Friberg, 1975.

Teknisk slutrapport LIFE02NAT/S/008484 Platåberget Kinnekulle – restaurering och bevarande, Länsstyrelsen i Västra Götalands län, 2008.

Tidernas Lidköping: en bok om kulturmiljöer i Lidköpings kommun, Erik Holmström 1991.

Torsö förr och nu: en bok om Torsö, Torsö hembygdsförening, 2000.

Torsösnipan, Peter Skanse, Båtdokumentationsgruppen, 1985.

Torsösnipan: en allmogebåt. Kristina Johansson, 1981.

Uppföljning av naturskyddade gräsmarker- Västra Götalands län 2007, Länsstyrelsen i Västra Götalands län, Rapport nr 2008:60.

Utter - en barmarksinventering i norra delen av Västra Götalands län år 2001. En rapport från *miljöövervakningen*, Länsstyrelsen i Västra Götalands län, Rapport nr 2002:03.

Vadsbobygden: en tidskrift från Vadsbo Hembygds- och Fornminnesförening.

Vattenkemi och mjukbottenfauna i Mariestadsfjärden 2004. SLU, Inst. för miljöanalys, 2005.

Vattenkemi och mjukbottenfauna i Mariestadsfjärden 2003. SLU Institutionen för Miljöanalys, 2004.

Vattenkemi och mjukbottenfauna i Mariestadsfjärden 2000. SLU Institutionen för Miljöanalys, 2001.

Vattenvårdsplan för Vänern. Djur och växter i Vänern - Fakta om Vänern. Bakgrundsdokument 2. Vänerns vattenvårdsförbund, Rapport 44, 2006.

Vattenvårdsplan för Vänern - Hur mår Vänern? Bakgrundsdokument 1. Vänerns vattenvårdsförbund, Rapport nr 40, 2006.

Vattenvårdsplan för Vänern - Mål och åtgärder. Vänerns vattenvårdsförbund, Rapport nr 39, 2005.

Vattenvårdsplan för Vänern. Vänern och människan. Bakgrundsdokument 3. Vänerns vattenvårdsförbund, Rapport nr 43, 2006.

Vegetationsinventeringar på Kinnekulle sommaren 2004, Länsstyrelsen i Västra Götalands län, 2004.

Vid Vänern: natur och kultur, Vänermuseets årsskrift 2000.

Vitmärlans reproduktion i Vänern och Vättern 2002. Vänerns vattenvårdsförbund rapport nr 24, Vätternvårdsförbundet och Naturvårdsverket, 2003.

Vägen till din historia. Kulturhistorisk beskrivning. Skaraborgs län. Västergötlands fornminnesförenings tidskrift 1985.

Vägvisare till Kinnekulle, en skrift om människan, naturen och landskapet, Länsstyrelsen i Västra Götalands län, Rapport nr 2007:46. www.kinnekullenatur.se

Vänern 1997 - årsskrift från Vänerns vattenvårdsförbund. Vänerns vattenvårdsförbund, Rapport nr 6, 1998.

Vänern - tema biologisk mångfald. Årsskrift 2000 från Vänerns vattenvårdsförbund. Rapport nr 11, 2000.

Vänern - Årsskrift 1999 från Vänerns vattenvårdsförbund. Vänerns vattenvårdsförbund, Rapport nr 7, 1999.

Vänern – Årsskrift 2007. Vänerns vattenvårdsförbund, Rapport nr 47. 2007.

Vänern. Årsskrift 2006 från Vänerns vattenvårdsförbund. Vänerns vattenvårdsförbund, Rapport nr 42, 2006.

Vänern. Årsskrift 2005 från Vänerns vattenvårdsförbund. Vänerns vattenvårdsförbund, Rapport nr 38, 2005.

Vänern. Årsskrift 2004 från Vänerns vattenvårdsförbund. Vänerns vattenvårdsförbund, Rapport nr 33, 2004.

Västra Götalands Runstenar, RoseMarie och Håkan Dahlin, http://web.telia.com/~u50102110/.

Vättlösa förr och nu, Vättlösa Hembygdsförening, 1996.

Willkommen auf dem Kinnekulle! Eine broschure uber die Menschen, die Natur und die Landshaft des Berges. Die Provincialregierung von Västra Götaland. Rapport 2007:46. www.kinnekullenatur.se

Årsskrift 2001 *från Vänerns vattenvårdsförbund*. Vänerns vattenvårdsförbund, Rapport nr 18, 2001.

Årsskrift 2002 *från Vänerns vattenvårdsförbund*. Vänerns vattenvårdsförbund, Rapport nr 22, 2002.

Årsskrift 2003 *från Vänerns vattenvårdsförbund.* Vänerns vattenvårdsförbund, Rapport nr 27, 2003.

Åtgärdsidéer för några sandstränder och strandängar. Vänerskärgården i Götene, Lidköpings och Mariestads kommuner. Vänerns vattenvårdsförbund. Rapport nr 46, 2007.

Ängs- och hagmarker i Västra Götalands län – vad har hänt på 15 år?, Länsstyrelsen i Västra Götalands län, Rapport nr 2006:74.

Översiktlig kulturhistorisk inventering, Götene kommun. Skaraborgs Länsmuseum 1977, Skara 1980.

Översiktlig kulturhistorisk inventering i Lidköpings kommun, Skaraborgs läns museum och Lidköpings kommun, 1977.

Översiktsplan Lidköpings kommun, Lidköpings kommun, 2003.

Övervakning av bottenfauna i Vänern och dess vikar – ett tioårigt perspektiv. Vänerns vattenvårdsförbund, Rapport nr 12, 2000.

Övervakning av fågelfaunan på Vänerns fågelskär – Metodutvärdering och förslag till framtida inventeringar. Vänerns vattenvårdsförbund. Rapport nr 13, 2000.

Övervakning av miljöförändringar i hagmarker i Västra Götalands län 1998. – Länsstyrelsen i Västra Götalands län, Rapport nr 1999:2.

Appendix 8. Photographs

Core areas

A selection of Core areas within the proposed biosphere reserve.

Natural pasture at Österplana
Photo: Birgitta Gärdefors

Meadow at Västerplana
Photo: Birgitta Gärdefors

Salen nature reserve
Photo: Birgitta Gärdefors

Deciduous forest at Munkängarna
Photo: Birgitta Gärdefors

Oak meadow
Photo: Birgitta Gärdefors

Törnsäter nature reserve
Photo: Birgitta Gärdefors

Ekudden nature reserve
Photo: Johanna MacTaggart

Ekudden nature reserve
Photo: Håkan Magnusson

Lady's slipper orchid
Photo: Götene municipality

Kinnekulle trail
Photo: Johanna MacTaggart

Footbridge over the river Sjöråsån
Photo: Birgitta Gärdefors

Brommö island
Photo: Johanna MacTaggart

Brommö and Hovden islands
Photo: Johanna MacTaggart

Built environments

A selection of environments within the proposed biosphere reserve.

Husaby church
Photo: Götene municipality

Hellekis manor farm
Photo: Birgitta Gärdefors

Lake Vänern Museum
Photo: Lake Vänem Museum

Spiken fishing harbour
Photo: Johanna MacTaggart

Navens light house
Photo: Johanna Olsson

Läckö castle
Photo: Johanna Olsson

Göta Canal
Photo: Mariestad tourist office

Old Town in Mariestad
Photo: Mariestad tourist office

Husaby bishop's fortress
Photo: Johanna MacTaggart

Bird tower in the bay of Sjöråsviken
Photo: Birgitta Gärdefors

Rock carvings at Flyhov
Photo: Götene municipality

Coastal ecosystems and wetlands

A selection of environments within the proposed biosphere reserve

Rocky shore
Photo: Mariestad tourist office

Archipelago
Photo: Mariestad tourist office

Archipelago
Photo: Johanna Olsson

Tegelängen wetland
Photo: Stefan Östman

River Tidan
Photo: Mariestad municipality

Reed area
Photo: Birgitta Gärdefors

Activities in the area

Walk on Brommö
Photo: Johanna MacTaggart

Bird ringing at Hindens rev
Photo: Johanna MacTaggart

Natural pastures walk on Kinnekulle
Photo: Johanna MacTaggart

Walk on Årnäs shore meadows
Photo: Johanna MacTaggart

Walk in Källstorp Natura 2000
Photo: Jonas Lind

Ekuddenday
Photo: Johanna MacTaggart

Hållplats Vänern mobile field station

Photo: Lake Vänern Museum

Upper secondary school pupils at work (Lake Vänern programme)
Photo: Lake Vänern Museeum

Department of Conservation
University of Gothenburg
Photo: Mariestad municipality

Guided tour of millstone quarry
Photo: Johanna MacTaggart

Green farm meat from natural pastures
Photo: Johanna MacTaggart

Building nesting boxes
Photo: Johanna MacTaggart

Historic photos

Net fishing
Photo: Lake Vänern Museum

Bicycle outing
Photo: Lake Vänern museum

Lidköping town hall
Photo: Lake Vänern museum

Limtorget, old town quarters in Lidköping
Photo: Lake Vänern museum

Grazing cattle
Photo: Lake Vänern museum

Cows at Naven
Photo: Lake Vänern museum

Appendix 9. Letters of recommendation

Biosfär
KANDIDAT
VÄNERSKÄRGÅRDEN
MED KINNEKULLE

19 januari 2009

Rekommendationsbrev från biosfärkandidatområdets styrgrupp

Vänerskärgården med Kinnekulle är resultatet av ett flerårigt arbete där tre kommuner i samverkan har format det som kan bli ett av Unescos modellområden för hållbar utveckling. Tillsammans med lokala och regionala aktörer, organisationer och medborgare har material bearbetats, projekt initierats och genomförts. Slutligen har detta sammanställts i dokumentet *Ansökningsformulär för biosfärområde Vänerskärgården med Kinnekulle*. Det lokala engagemanget har varit stort under tiden som *Vänerskärgården med Kinnekulle* utvecklats, vilket är en förutsättning för ett fortsatt starkt arbete.

Styrgruppen anser att satsningen på ett biosfärområde är mycket viktigt för *Vänerskärgården med Kinnekulle*. Områdets höga natur- och kulturvärden är betydelsefulla ur nationellt och internationellt perspektiv. Ett biosfärområde är den lämpligaste formen för att på bästa sätt vårda och värna landskapets olika miljöer så väl som för att tillgodose lokalsamhällenas ekonomiska och sociala utveckling. *Vänerskärgården med Kinnekulle* är ett område där nyttjande och bevarande går hand i hand.

Styrgruppen förordar att Regeringen nominerar *Vänerskärgården med Kinnekulle* som ett av Unescos biosfärområden.

Nils Farken
Ordförande

Johanna MacTaggart
Biosfärkoordinator

Postadress: Götene kommun, 533 80 Götene
Telefon: 0501 75 50 00
Hemsida: www.vanerkulle.se
E-post: info@vanerkulle.se

TRANSLATION OF ORIGINAL DOCUMENT

Biosphere Candidate Area
Lake Vänern Archipelago
and Mount Kinnekulle

19 January 2008

Recommendation Letter from the Biosphere Candidate Area Steering Group

Lake Vänern Archipelago and Mount Kinnekulle is the result of several years' work involving three municipalities in the shaping of a potential UNESCO model area for sustainable development. Together with local and regional stakeholders, organisations and citizens, material has been processed, and projects have been initiated and implemented. Finally, the material has been collated and presented as the *Biosphere Reserve Nomination Form Lake Vänern Archipelago and Mount Kinnekulle*. Strong local commitment was demonstrated during the development phase of *Lake Vänern Archipelago and Mount Kinnekulle*, which is a prerequisite for the future strength of the project.

The steering group believes that efforts to create a biosphere reserve are vital for *Lake Vänern and Mount Kinnekulle*. The high natural and cultural values in the area are important from a national and as well as an international perspective. A biosphere reserve is the most appropriate form for the management and safeguarding of the varied natural habitats, as well as for meeting the economic and social development of the local communities in the area. In *Lake Vänern Archipelago and Mount Kinnekulle* usage and conservation go hand-in-hand.

The steering group strongly recommends the Swedish Government to nominate *Lake Vänern Archipelago and Mount Kinnekulle* as a UNESCO Biosphere Reserve.

Nils Farken
Chairman

Johanna MacTaggart
Biosphere coordinator

Address:	Tel:	Website	W-mail
Götene Municipality 533 80 Götene	+46 501-75 50 00	www.vanerkulle.se	info@vanerkulle.se

Götene kommun

2009-01-16

Rekommendationsbrev från Götene kommun

Vänerskärgården med Kinnekulle – ett världsomspännande utvecklingsprojekt

Arbetet med att få "Vänerskärgården med Kinnekulle" klassat som ett biosfärområde, har nu pågått i fyra år. Det är de tre kommunerna Mariestad, Lidköping och Götene som gemensamt har tagit initiativ till utvecklingen av området som ett biosfärområde.

Biosfärområden är modellområden, där bevarande och utveckling går hand i hand. Utnämningen till biosfärområde skapar nya möjligheter till att öka förståelsen för ett hållbart brukande av landskapet. Genom samverkan mellan lokalbefolkning, föreningar, företag, myndigheter och forskning kan olika intresseområden stärkas. Ett biosfärområde bygger därför på lokalt engagemang och på den traditionella kunskapen som finns inom området. I ledorden är att bevara landskap och arter, utveckla området på ett hållbart sätt samt att stödja undervisning och forskning.

Götene kommun har tagit aktiv del i arbetet sedan år 2004 och sedan år 2005 har en styrgrupp bildats där två ledamöter från kommunen har ingått. Kommunen har hela tiden varit delaktig i arbetsgruppen, som tillsammans har färdigställt nomineringshandlingen till UNESCO. Det blivande biosfärområdets förhållningssätt, att verka för en hållbar utveckling, stämmer väl överens med Götene kommuns ledstjärna, där hållbar utveckling skall genomsyra den kommunala verksamheten. För att uppnå det hållbara samhället krävs hårt arbete inom olika områden.

Att skapa ett biosfärområde innebär en utmärkelse för tidigare genomfört arbete och en utmaning för framtiden.
Det är vår övertygelse att "Vänerskärgården med Kinnekulle" med dess rika landskap och engagerade människor på ett utmärkt sätt fortsätter att driva arbetet med hållbar utveckling. Genom biosfärkonceptet ökar möjligheten att skapa en ekonomisk utveckling som är ekologiskt och socialt hållbar. Utmärkelsen kommer att möjliggöra ett nationellt och internationellt stöd som kommunen ser som mycket positivt. Götene kommun fortsätter att stödja arbetet enligt beslut i kommunfullmäktige den 3 november 2008.

Götene kommun ger sina bästa rekommendationer om att "Vänerskärgården med Kinnekulle" nomineras som ett internationellt biosfärområde av regeringen under år 2009.

Bo Bergsten
Kommunstyrelsens ordförande

Kommunledning **Postadress** 533 80 GÖTENE **Besöksadress** Torggatan 4
Tel 0511-38 60 00 **Direkt nr.** 0511-38 60 05 **Fax** 0511-597 92 **E-post** bo.bergsten@gotene.se
Org.nr 212000-1652 **Bankgiro** 5824-9814 **Postgiro** 12 14 73-3 **www.gotene.se**

TRANSLATION OF ORIGINAL DOCUMENT

Götene Municipality 16 January 2009

Recommendation letter from Götene Municipality

Lake Vänern Archipelago and Mount Kinnekulle – a worldwide development project

Work towards the designation of Lake Vänern Archipelago and Mount Kinnekulle as a biosphere reserve has been going on for four years. The initiative for the development of the area into a biosphere reserve was taken jointly by Mariestad, Lidköping and Götene municipalities.

Biosphere reserves are model areas where conservation and development go hand-in-hand. The designation as a biosphere reserve creates new opportunities for increasing the understanding of a sustainable use of the landscape. Collaboration between local citizens, associations, businesses, authorities and research helps strengthen different fields of interest. A biosphere reserve is thus founded on local commitment and traditional knowledge that exists in the area. Catch phrases are: to conserve landscapes and species, to develop the area in a sustainable way, and to support education and research.

Götene Municipality has actively participated in the work since 2004 and has had two members in the steering group that was set up in 2005. The municipality has also been active in the working group that prepared the Unesco nomination documents. The approach of the proposed biosphere reserve – working for sustainable development – is fully in accordance with our own guiding light, where sustainable development permeates all municipal activities. To achieve a sustainable society hard work is required on all fronts.

The designation of a biosphere reserve is an award for work already carried out as well as a challenge for the future.
We are certain “Lake Vänern Archipelago and Mount Kinnekulle” with its rich landscape and committed citizens will continue the progress of sustainable development. The biosphere concept increases the opportunities for creating an economic development that is ecologically and socially sustainable. The designation will enable national and international support, something that the municipality regards favourably. Götene Municipality will continue to support the work in accordance with a council decision taken on 3 November 2008.

Götene Municipality warmly recommends the nomination of “Lake Vänern Archipelago and Mount Kinnekulle” as an International Biosphere Reserve by the Swedish Government during 2009.

Bo Bergsten
Chair of the Municipal Executive Committee

Lidköpings kommun

2008-12-15

Sveriges Regering
Regeringskansliet

103 33 STOCKHOLM

Biosfärområdet Vänerskärgården med Kinnekulle

Utvecklingen av Biosfärområde Vänerskärgården med Kinnekulle är ett gemensamt initiativ som togs av de tre kommunerna Lidköping, Götene och Mariestad under hösten 2004. Målet var att finna former för att förvalta värdena i landskapet samtidigt som området utvecklas på ett ekonomiskt och socialt hållbart sätt. Ett biosfärområde är verktyget som möjliggör detta.

Sedan 2005 har Lidköpings kommun tagit aktiv del i arbetet genom att två ledamöter deltagit i styrgruppen och genom att engagera tjänstemän i biosfärarbetets processer med syftet att låta det blivande biosfärområdets förhållningssätt *Hållbar utveckling* genomsyra den kommunala verksamheten. Kommunen har varit delaktig i arbetsgruppen som färdigställt nomineringshandlingen till Unesco och anser att den väl återger kommunens ambitioner för att värna landskapets biologiska, ekologiska och kulturmiljövärden.

Det är vår övertygelse att Vänerskärgården med Kinnekulle med dess rika landskap och engagerade människor på ett utmärkt sätt kommer att bidra i vårt fortsatta arbete med hållbar utveckling. Inte minst i det pågående planeringsarbetet för ett nytt naturrum vid Läckö slott där biosfärområdet kommer att finnas med som en naturlig del. Utmärkelsen kommer att lyfta arbetet samt möjliggöra ett nationellt och internationellt stöd som kommunen ser som mycket positivt. Arbetet med biosfärområdet har också banat väg för ett konstruktivt samarbete över kommungränserna som kommer att bli allt viktigare framöver. Lidköpings kommun fortsätter att stödja arbetet enligt beslut i kommunfullmäktige den 27 oktober 2008.

Lidköpings kommun ger sina bästa rekommendationer till regeringen att Vänerskärgården med Kinnekulle nomineras som ett internationellt biosfärområde under 2009.

För Lidköpings kommun

Marita Bengtsson
Kommunfullmäktiges ordförande

Kenth Lindström
Kommundirektör

Post
Lidköpings kommun
Kommunledningskontoret
531 88 LIDKÖPING vid Vänern

Besök
Stadshuset
Skaragatan 8

Telefon
0510-77 00 00
Fax
0510- 77 01 88

Org.nr
212000-1694
VATnr
SE212000189401

Internet
www.lidkoping.se
E-post
kommun@lidkoping.se

TRANSLATION OF ORIGINAL DOCUMENT

Lidköping Municipality

15 December 2008

Swedish Government
Swedish Government Offices
SE-103 33 Stockholm

Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve

The development of the Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve is a joint initiative taken by the three municipalities Lidöping, Götene and Mariestad during the autumn of 2004. The aim was to find forms for the management of values and assets in the countryside while ensuring that the area develops in an economic and socially sustainable way. The creation of a biosphere reserve is a tool for enabling such a development.

Since 2005, Lidköping Municipality has actively participated in the work by having two members on the steering group and by engaging officers in the processes of the biosphere reserve. The purpose of this has been to enable the *sustainable development* approach of the proposed biosphere reserve to permeate all municipal activities. The municipality has participated in the working group that has prepared the nomination form for submission to Unesco, and we believe that it fully reflects the municipality's ambitions for safeguarding the biological, ecological and cultural values in the landscape.

We firmly believe that the Lake Vänern Archipelago and Mount Kinnekulle area, with its rich landscape and committed citizens, will offer a first-rate contribution to our work with sustainable development in the future. Not least regarding the ongoing plans for a new naturum at Läckö Castle, where the biosphere reserve will feature as an obvious part. The designation will boost the work and attract national and international support, something which the municipality views as highly beneficial. Work with the biosphere reserve has also paved the way for constructive cooperation across municipality borders, something that will become increasingly important in the future. Lidköping Municipality will continue to support the work in accordance with a council decision taken on 27 October 2008.

Lidköping Municipality highly recommends the Swedish Government to nominate Lake Vänern Archipelago and Mount Kinnekulle as a Biosphere Reserve during 2009.

On behalf of Lidköping Municipality

Marita Bengtsson
Chairman of the Council

Kenth Lindström
Chief Executive Officer

MARIESTADS KOMMUN

2008-12-16

Rekommendationsbrev från Mariestads kommun angående Biosfärområde Vänerskärgården med Kinnekulle

Idén till att bilda ett biosfärsområde med berget Kinnekulle i centrum kom upp i samtal kring utveckling för Kinnekullebygden i Götene kommun. Från Kinnekulle kan man se ut över stora delar av Mariestads och Lidköpings kommuner utmed ett strålande innanhav, Vänern med skärgård. Man ser värdefulla skogar och fruktbara åkrar. Det är tydligt att människor är verksamma i gårdar, byar och städer med en förankring i sitt omgivande kulturlandskap. En utvidgning av biosfärområdet till att även omfatta hela Vänerkustens omland inom Mariestads, Götene och Lidköpings kommuner blev i detta sammanhang självklar.

Tanken är svindlade! Inom ramen för ett biosfärsområde skulle det kunna vara möjligt att samla människorna i en bygd till en hållbar samhällsutveckling som skulle ge dem förutsättningar att verka över framtida generationer. Tänk att i årtusenden kunna blicka ut över och uppleva ett bestående landskap i Vänerskärgården med Kinnekulle, ett landskap som är sällsamt rikt på höga natur- och kulturvärden.

Vi är många i Mariestads kommun som under vår kandidatur till biosfärsområde har förstått att just biosfärkonceptet kan ge oss en särskild kraft för kommunens utveckling. Vi är övertygande om att en samverkan med Lidköpings och Götene kommuner än mer stärker kommunernas gemensamma utvecklingsambitioner. Det är också en styrka att både nationellt och internationellt kunna arbeta med utvecklingsidéer tillsammans med andra biosfärområden.

Vi har valt att utforma vårt biosfärsområde så att det finns en balans mellan orörd natur, mark för odling, skog och sjö. I området finns det goda möjligheter att utveckla förnybar energi. I tätorter och på landsbygden finns det ett stort antal människor, som är beredda att på ett offensivt och hållbart sätt leda utvecklingen framåt. Vi vill med dessa förutsättningar visa att biosfärområdet Vänerskärgården med Kinnekulle kan vara ett modellområde för utvecklingen i världen.

KOMMUNLEDNINGSKONTORET

POSTADRESS 542 86 MARIESTAD
BESÖKSADRESS Stadshuset, Kyrkogatan 2, MARIESTAD
TELEFON 0501-75 50 00
FAX 0501-75 50 09
HEMSIDA www.mariestad.se
E-POSTADRESS info@mariestad.se

Vänerskärgården med Kinnekulle skulle stärkas i sin utveckling om det blir godkänt som biosfärsområde av UNESCO. Mariestads kommun anhåller, med stöd av kommunfullmäktige godkänd ansökan, att regeringen nominerar Vänerskärgården med Kinnekulle som ett internationellt biosfärsområde enligt kriterier från Man and the Biosphere programme (MAB)/UNESCO.

Ulla Göthager
Kommunstyrelsens ordförande
Mariestads kommun

TRANSLATION OF ORIGINAL DOCUMENT

Mariestad Municipality 16 December 2008

Recommendation letter from Mariestad Municipality regarding Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve

The idea of creating a biosphere reserve centred around Mount Kinnekulle was raised in discussions on the development of the Kinnekulle area in Götene Municipality. The plateau mountain offers views across large parts of Mariestad and Lidköping municipalities along a fantastic inland sea - lake Vänern and its archipelagos. From Mount Kinnekulle you can see valuable forests and fertile fields. It is evident that people working on farms and in villages and towns are firmly rooted in their surrounding cultural landscape. In this context, an extension of the biosphere reserve to include the shores of Lake Vänern and the areas surrounding all three municipalities was natural.

The thought is staggering! Within the framework of a biosphere reserve it is possible to spur whole communities into working for sustainable development with benefits for generations to come. Imagine that people for thousands of years will gaze out on and experience a lasting landscape around Lake Vänern Archipelago and Mount Kinnekulle, a landscape that is particularly rich in natural and cultural values.

During the candidacy, many people in Mariestad Municipality have realised that the concept of a biosphere reserve offers additional strength in the development of the municipality. We are convinced that the collaboration with Lidköping and Götene municipalities further strengthens our common ambitions for development. Being able to work both nationally and internationally with development ideas together with other biosphere reserves is also an asset.

We have chosen to develop our biosphere reserve as to create a balance between untouched countryside, land for cultivation, forest and lake. The area offers good opportunities for the development of renewable energy. A large number of people in both urban and rural areas are prepared to take the development further in a powerful and sustainable way. With such prerequisites, we want to make Lake Vänern Archipelago and Mount Kinnekulle a model area for development around the world.
Designating Lake Vänern Archipelago and Mount Kinnekulle as a biosphere reserve by UNESCO would strengthen the development of the area. Mariestad Municiality therefore requests, with the support of the nomination documents approved by the municipal council, that the Swedish Government nominates Lake Vänern Archipelago and Mount Kinnekulle as an International Biosphere Reserve according to the criteria in the Man on the Biosphere programme (MAB/UNESCO).

Ulla Göthager
Chair of the Municipal Executive Committee
Mariestad Municipality

MUNICIPAL EXECUTIVE OFFICE
Address: Stadshuset, Kyrkogatan 2, 542 86 Mariestad
Tel: +46 501-75 50 00
Fax: +46 501-75 50 09
Website: www.mariestad.se
E.mail: info@mariestad.se

LÄNSSTYRELSEN
VÄSTRA GÖTALANDS LÄN

2008-12-12

Diarienummer
511-036038-2008

Sida
1(1)

Rekommendationsbrev inför bildandet av biosfärområdet Vänerskärgården med Kinnekulle

Länsstyrelsen har under flera år följt arbetet inom biosfärkandidatområdet Vänerskärgården med Kinnekulle och även aktivt stöttat projektet genom att genomföra ett pilotprojekt för regional landskapsstrategi inom området. I förankringsprocessen för ett framtida biosfärområde har man byggt upp breda nätverk som utgör en bra grund för samverkan för hållbar utveckling. Man arbetar också aktivt med att utveckla området för ekoturism.

Genom ett framtida biosfärområde bedömer länsstyrelsen att det finns stora möjligheter att utveckla en helhetssyn för långsiktigt hållbar utveckling i ett landskapsperspektiv. Genom arbetssättet med dialog och förankring har biosfärområdet en bra grund att stå på. Arbetet överensstämmer dessutom bra med de tankar som finns i den europeiska landskapskonventionen, ELC.

Länsstyrelsen ser med tillförsikt fram emot det fortsatta arbetet inom området och har stora förhoppningar på ett fortsatt aktivt arbete för att utveckla området till ett modellområde för långsiktigt hållbar utveckling.

Länsstyrelsen tillstyrker att området utnämns till biosfärområde.

Göran Bengtsson
Länsöverdirektör

Kopia till
Akten
Sven Swedberg
Maria Thordarson
Jörel Holmberg

Postadress: 542 85 MARIESTAD | Besöksadress: Hamngatan 1 | Telefon/Fax: 031-60 60 00 (växel) 0501-60 64 40 (fax) | Webbadress: www.lansstyrelsen.se/vastragotaland | E-post: [illegible]

TRANSLATION OF ORIGINAL DOCUMENT

County Administrative Board		Registration number	Page
Västra Götaland	12 December 2008	511-036038-2008	1(1)

Letter of recommendation in support of the creation of Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve

The County Administrative Board of Västra Götaland has followed the progress of the Lake Vänern Archipelago and Mount Kinnekulle biosphere reserve candidacy for several years and also actively supported the project by carrying out a pilot project for regional landscape strategy within the area. During the process of gaining support for a future biosphere reserve, wide-ranging networks have been created, forming a solid basis for cooperation around sustainable development. Work is also actively progressing to develop the area for ecotourism.

The County Administrative Board believes that a future biosphere reserve will offer great opportunities for developing a comprehensive view of long-term sustainable development from a landscape perspective. The method of dialogue and gaining support offers a firm foundation for the biosphere reserve. The work also reflects ideas expressed in the European Landscape Convention, ELC.

The County Administrative Board has confidence in the continued work within the area and has great expectations for future activities to develop the biosphere reserve into a demonstration area for long-term sustainable development.

The County Administrative Board warmly supports the nomination of the area as a Biosphere Reserve.

Göran Bengtsson
Deputy County Governor

Copies to
Akten
Sven Swedberg
Maria Thordarson
Jörel Holmberg

Address:
Hamngatan 1
542 85 Mariestad
Sweden

Tel/Fax
+46 31-60 50 00 (Switchboard)
+46 501-60 54 40 (fax)

Web address
www.lansstyrelsen.se/vastragotaland

E-mail
natur.vastragotaland@lansstyrelsen.se

SKOGSSTYRELSEN

1(1)

Datum
2008-12-15

Diarienr
2008/6491

Skaraborg
Anders Wiborg
Lundenvägen 2, 541 39 Skövde
anders.wiborg@skogsstyrelsen.se
Tfn 0500-381203, fax 0500- 413217

Biosfärkandidatområde
Vänerskärgården med Kinnekulle
Götene kommun
533 80 Götene

Rekommendationsbrev

Skogsstyrelsen har med intresse följt och även i en arbetsgrupp medverkat i utvecklingen av Biosfärkandidatområdet Vänerskärgården med Kinnekulle.

Vänerns kust, intilliggande landskap och skärgård utgör ett mycket rikt och unikt område för växter, djur och människor. Den långa strandlinjen har en stor variation av strandnära miljöer som skapar förutsättningar för värdefull biologisk mångfald, exempel på detta är gamla vindpinade tallskogar på bergbunden mager mark och bördiga marker med stort inslag av ädla lövträd som ek, ask och lind.

Kinnekulle ingår i sin helhet i biosfärkandidatområdet och har flera riksintressen att värna. Det mäktiga kalkstenslagret skapar där miljöer som är mycket skyddsvärda även i ett europeiskt perspektiv. Artrikedomen i dessa miljöer är unik och kräver en väl anpassad skötsel för att överleva. En levande landsbygd med kulturpåverkan i form av bland annat betande djur är en förutsättning för många sällsynta arter. Viktigt är också att särskilt fina skogsmiljöer på Kinnekulle och i skärgården får utvecklas mer ostört. Dessa miljöer bör skyddas genom naturreservat och biotopskydd.

Vänerskärgården och Kinnekulle är ett område som årligen lockar ett stort antal turister. Något som är viktigt för den levande landsbygden men som samtidigt kräver god planering från olika näringsidkare, kommuner och myndigheter

Skogsstyrelsen har som myndighet ett sektorsansvar för skogen och en viktig uppgift är att göra avvägningen mellan just produktionsmålet och miljömålet. Skogens betydelse för markägarnas ekonomi, deras värde för biologisk mångfald, för människors rekreation och välbefinnande kan ses och tas till vara i ett helhetsperspektiv som omfattar hela landskapet. Skogsstyrelsen uppmuntrar därför Vänerskärgårdens med Kinnekulles utveckling av ett hållbart brukande genom konceptet biosfärområde.

Vi stödjer helhjärtat Vänerskärgården med Kinnekulles kandidatur.

På Skogsstyrelsens vägnar

Anders Wiborg
Distriktschef

Postadress
Huvudkontor
Skogsstyrelsen
551 83 Jönköping

Besöksadress
Vallgatan 8
Jönköping

Telefon
036-35 93 00
Fax
036-16 61 70

Organisationsnr
202100-5612
Momsreg.nr
SE202100561201

E-post
skogsstyrelsen@skogsstyrelsen.se
www.skogsstyrelsen.se

TRANSLATION OF ORIGINAL DOCUMENT

SWEDISH FOREST AGENCY

Date
15 December 2008

Registration number
2008/6491

Skaraborg
Amders Wiborg
Lundevägen 2, 541 39 Skövde
anders.wiborg@skogsstyrelsen.se
Tel +46 500-381203, Fax +46 500-413217

Biosphere Reserve Candidate Area
Lake Vänern Archipelago and Mount Kinnekulle
Götene Municipality
SE533 80 Götene, Sweden

Letter of recommendation

The Swedish Forest Agency has with great interest followed the development of the biosphere reserve candidate area Lake Vänern Archipelago and Mount Kinnekulle, and has also participated in one of the working groups.

The coast of Lake Vänern and the adjoining countryside and archipelago constitute a rich and unique area for plants, animals and people. The long shoreline contains a great variety of waterside environments which have the prerequisites for valuable biological diversity, for example old windswept pine forests on rock-bound nutrient-poor soil, and fertile soils largely interspersed with broadleaf trees such as oak, ash and lime.

Mount Kinnekulle, included in its entirety in the biosphere candidate area, has a number of national interests for safeguarding. Here, the majestic limestone strata creates environments that are highly worthy of protection, even in a European perspective. The rich diversity of species in these environments is unique and requires well-adapted management to ensure survival. A living countryside with cultural influence by way of e.g. grazing animals is a prerequisite for many rare species. It is also important that especially fine forest environments on Mount Kinnekulle and in the archipelago are allowed to develop undisturbed. Such environments should be protected as nature reserves and habitat protection areas.

The Lake Vänern Archipelago and Mount Kinnekulle area attracts a large number of tourists every year. This is vital for a living countryside, but also requires sound planning by entrepreneurs, municipalities and authorities.

As an authority, the Swedish Forest Agency has forest sector responsibility, and a major assignment is to balance the production of wood with the protection of environmental values. The importance of forests for the economy of landowners, the value of biological diversity, and recreation and well-being of people can be regarded and safeguarded with an overall perspective that includes the entire landscape. The Swedish Forest Agency therefore encourages the development of sustainable use of the Lake Vänern Archipelago and Mount Kinnekulle area through the concept of a biosphere reserve.

We wholeheartedly support the candidacy of the Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve.

On behalf of the Swedish Forest Agency

Ander Wiborg
District Manager
Biosphere candidate area Lake Vänern and Mount Kinnekulle

Address	Tel	Organisation number	E-mail
Main Office	+46 36-35 93 00	2022100-5612	skogsstyrelsen@skogsstyrelsen.se
Swedish Forest Agency	Fax	VAT registration	www.skogsstyrelsen.se
Vallgatan 8	+46 36-16 61 70	SE202100561201	
551 83 Jönköping			
Sweden			

VÄSTRA GÖTALANDSREGIONEN

2008-12-19

Rekommendationsbrev från Västra Götalandsregionen inför bildandet av biosfärområde Vänerskärgården med Kinnekulle

Västra Götalandsregionen kommer att ha deltagit i arbetet under tiden 2005 – juni 2009 med medfinansiering och har därutöver deltagit i projektgruppen för Ekoturismutveckling samt i flera arbetsgrupper, allt inom ramen för biosfärarbetet.

Det aktuella området har stora kulturella värden och unika naturbetingelser ur såväl nationell som internationell synvinkel. Kopplingen mellan maritim miljö med innanhavet Vänern och dess skärgårdar och landskapsperspektivet i övrigt med bl.a. det unika platåberg Kinnekulle, rikt på naturvärden, samt möjligheter till hållbara transporter på bl.a. Kinnekullebanan ger tillsammans mycket goda förutsättningar för en hållbar utveckling. Det tvärsektoriella och tvärvetenskapliga arbetssättet är unikt där även mobilisering av lokalbefolkning och föreningslivet ingått som en integrerad del. Tillsammans ger allt detta goda möjligheter för en hållbar utveckling.

Västra Götalandsregionen förordar att regeringen nominerar Vänerskärgården med Kinnekulle som ett internationellt biosfärområde enligt MAB/UNESCOs kriterier. Västra Götalandsregionen kommer på lämpligt sätt stödja arbetet i biosfärområdet enligt nämnda kriterier.

REGIONUTVECKLINGSNÄMNDEN

Kent Johansson
Ordförande

TRANSLATION OF ORIGINAL DOCUMENT

19 December 2008

Letter of recommendation from Västra Götaland Region in support of the creation of Lake Värnern Archipelago and Mount Kinnekulle Biosphere Reserve

Västra Götaland Region will have participated in the work during the period 2005 – June 2009 through co-funding and has also participated in the project group for the development of Ecotourism and in several other working groups, all within the framework of the biosphere reserve project.

The area in question contains great cultural values and unique natural conditions, seen from a national as well as an international point of view. The link between the maritime environments of the inland sea Lake Vänern and its archipelagos and other landscape perspectives such as the unique plateau mountain Mount Kinnekulle, rich in natural values, and the opportunities for sustainable transport on e.g. the Kinnekullebanan railroad, offer excellent conditions for sustainable development. The intersectorial and interdisciplinary working method is unique, and also includes the mobilisation of local citizens as an integral part. All in all, this offers great opportunities for sustainable development.

Västra Götaland Region recommends the Swedish Government to nominate Lake Vänern Archipelago and Mount Kinnekulle as an international Biosphere Reserve under the MAB/UNESCO criteria. Västra Götaland Region will support work in the biosphere reserve according to the above mentioned criteria in appropriate ways.

REGIONAL DEVELOPMENT COMMITTEE

Kent Johansson
Chairman

Johanna MacTaggart, Koordinator
Biosfärkandidatområde Vänerskärgården med Kinnekulle
Götene kommun
533 80 Götene

2008-12-18

År 2005 inleddes, på initiativ av en Götene, Lidköpings och Mariestads kommuner, ett samarbete med syfte att undersöka förutsättningarna för bildandet av ett biosfärområde. I detta skede etableras kontakt med projekt "Förstudie för biosfärområdet Vänerskärgården med Kinnekulle". Denna kontakt resulterar i ett samarbete delfinansierat av Vänermuseet via arbetsinsatser inom både projektets styrgrupp och tillfälliga arbetsgrupper. Vänermuseet har därefter fortlöpande aktivt deltagit i utvecklingen av projekts kandidatfas i strävan att erkännas som ett fullvärdigt biosfärområde.

De övergripande funktionerna i ett biosfärområde är att bidra till bevarandet av landskapet, ekosystemet, arter och dess genetiska variation samt främja ekonomisk utveckling och samhällsutveckling som är socio-kulturellt och ekologiskt hållbar. Samt stödja demonstrationsobjekt, miljöutbildning och praktik, forskning och miljöövervakning som relaterar till lokala, regionala, nationella och globala frågor om bevarande och hållbar utveckling. Funktioner som är väl överensstämmande med Vänermuseets övergripande funktion som regionalt ansvarsmuseum för förmedlingen av livet vid, i och på Vänern - Vänerområdets natur och kulturhistoria.

Vänermuseet vill med detta brev understryka betydelsen av att projektet "Vänerskärgården med Kinnekulle" får erkännande som ett fullgått biosfärsområde, enligt de ramar som anges av ansökan, och därmed möjlighör att projektet fortlever.

Vänermuseet vill framhålla projektet som ett mycket gott exempel på samarbete mellan kommuner, det lokala näringslivet samt forskningsinstitutioner som tillsammans främjar samhälls- och ekonomisk utveckling som är socio kulturellt och ekologiskt hållbar. Dessutom bidrar det till en ökad förståelse av vårt kulturarv hos allmänheten.

Pernilla Schedin
Museichef

Marcus Drotz
Biolog/Forskare

VÄNERMUSEET
Lidköpings kommun
Kommunvägen 2
531 54 Lidköping
0510-77 00 65
0510-77 11 16

TRANSLATION OF ORIGINAL DOCUMENT

18 December 2008

Johanna MacTaggart, Coordinator
Lake Vänern Archipelago and Mount Kinnekulle Biosphere Candidate Area
Götene Municipality
522 80 Götene

In 2005, a collaboration was initiated by Götene, Lidköping and Mariestad municipalities with the aim to investigate the prerequisites for the creation of a biosphere reserve. At this stage, contact was established with the project "Feasibility Study for Lake Vänern Archipelago and Mount Kinnekulle Biosphere Reserve". This resulted in a collaboration, partly funded by the Lake Vänern Museum through work in the project steering group and temporary working groups. Since then, Lake Vänern Museum has continued to actively participate in the development of the project's candidacy phase with the aim of achieving status as a recognised biosphere reserve.

The overall functions of a biosphere reserve are to contribute to the conservation of the landscapes, ecosystems, species and genetic variation, and to foster economic and human development which is socio-culturally and ecologically sustainable. Also, to support demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development. These functions are fully in accordance with the overall function of Lake Vänern Museum, as we have the regional responsibility of conveying life near and in Lake Vänern; i.e. the natural and cultural heritage of the Lake Vänern area.

Through this letter, Lake Vänern Museum wishes to stress the importance of recognising the project "Lake Vänern Archipelago and Mount Kinnekulle" as a worthy biosphere reserve under the framework stated in the nomination, thereby ensuring that the project lives on.

Lake Vänern Museum wishes to point out that the project is a highly successful example of cooperation between municipalities, local enterprises and research institutions, which together foster human and economic development which is socio-culturally and ecologically sustainable. It also contributes to the general public's understanding of our cultural heritage.

Pernilla Schedin
Museum Director

Marcus Drotz
Biologist/Researcher

GÖTEBORGS UNIVERSITET
INSTITUTIONEN FÖR KULTURVÅRD

Prof. Ola Wetterberg
Prefekt
031 786 4702, 070 623 4702

BIOSFÄRSOMRÅDE 1 / 1
2008-12-10 dnr 75 / 07

Rekommendationsbrev för Biosfärsansökan
Vänerskärgården med Kinnekulle

Institutionen för kulturvård vid Göteborgs universitet har tagit aktiv del i arbetet med att bilda ett biosfärområde för Vänerskärgården med Kinnekulle. Sedan arbetets början 2005 har institutionen varit adjungerad till det föreslagna biosfärområdets styrgrupp. Biosfärkoordinatorn Johanna MacTaggart, har under arbetet med biosfärområdet varit placerad vid institutionens verksamhet i Mariestad. Denna närhet har varit en resurs för koordinatorn i arbetet med framtagande av underlaget eftersom det funnits möjlighet att diskutera med lärare och ha tillgång till ett universitetsbibliotek. Närheten har också innburit att aspekter på biosfärsområdet på ett tidigt stadium har kunnat påverka planeringen av institutionens verksamhet.

Hösten 2008 startades ett nytt utbildningsprogram vid institutionen: Landskapsvårdens hantverk. Programmet är en treårig bachelor-utbildning som fokuserar på landskapets vård ur ett praktiskt och levandegörandeperspektiv, med utgångspunkt i de traditionellt hantverken. Temat hållbar utveckling löper som en röd tråd genom hela programmet och studenterna blir väl förtrogna med biosfärområdet.

Biosfärområdet kommer att utgöra en arena för forskning/utveckling och är därför en viktig resurs för studenterna. Vår förhoppning är att biosfärkontoret placeras i nära anslutning till Göteborgs universitets verksamhet i Mariestad som därmed kommer att utgöra en viktig resurs för vår framtida planering och utveckling.

Med vänliga hälsningar

Professor Ola Wetterberg
Prefekt

Institutionen för kulturvård
Stora Nygatan 23–25, Box 130, SE 405 30 Göteborg
Magasinsgatan 4, Box 77, SE 542 21 Mariestad
031 786 4700, 031 786 4703 (fax) | 0501 75 57 80, 0501 75 57 99 (fax)
www.conservation.gu.se

TRANSLATION OF ORIGINAL DOCUMENT

UNIVERSITY OF GOTHENBURG
DEPARTMENT OF CONSERVATION

Prof. Ola Wetterberg
Head of Department
031 786 4702, 070 623 4702

BIOSPHERE RESERVE 1 / 1
10 December 2008 reg. nr 75 / 07

Recommendation letter in support of the biosphere reserve nomination of Lake Vänern Archipelago and Mount Kinnekulle

The Department of Conservation at the University of Gothenburg has actively participated in the work to establish Lake Vänern Archipelago and Mount Kinnekulle as a biosphere reserve. Since work commenced in 2005, the department has been co-opted to the steering group of the proposed biosphere reserve.
During the candidacy the biosphere coordinator Johanna MacTaggart has been placed at the Department's facility in Mariestad. This close contact has been a valuable resource for the coordinator when preparing documentation, offering opportunities to discuss with teachers and access to a university library. It has also meant that some aspects of the biosphere reserve have at an early stage influenced the planning of activities within the department.

Autumn 2008 saw the start of a new educational programme at the department: Landscape Management. The programme offers a three-year Bachelor of Science in Conservation degree focused on landscape management from a practical and "bring back to life" perspective, based on traditional methods. The theme of sustainable development runs all through the programme and the students become well acquainted with the biosphere reserve.

The biosphere reserve will provide an arena for research/development and is therefore a vital resource for students. Our hope is that the biosphere office will be located in close connection to the University of Gothenburg's unit in Mariestad which would give us an important resource for our future planning and development.

With kind regards

Professor Ola Wetterberg
Head of Department

Department of Conservation
Stora Nygatan 23-25, Box 130, SE 405 30 Göteborg
Magasinsgatan 4, Box 77, SE 542 21 Mariestad
+46 31 786 4700, +46 31 786 4703 (fax) | +46 501 75 57 80, +46 501 75 57 99 (fax)
www.conservation.gu.se