Qualitative Valuation of Ecosystem Services in SEA in Sweden

Alies van Rhijn

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Alies van Rhijn

Supervisor: Antoienette Wärnbäck
Evaluator: Ann Åkerskog
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Abstract: This thesis is about evaluating the impacts of a detailed development plan on ecosystem services in strategic environmental assessment using qualitative methods. A qualitative approach is combined with economic concepts and the use of this method is explored through a case study in which the impact on ecosystem services is integrated into a strategic environmental assessment. The case study used in this thesis concerns the P18 area in Visborg, south of Visby, Gotland, which has been earmarked in a detailed development plan to become a sports and recreation area. The plan allows for the building of a sports hall, rerouting of the running tracks and the discontinuation of the motocross circuit. The study evaluates the impact of the implementation of the plan on ecosystem services and how this affects their stakeholders. In this study the impacts on the ecosystem services are identified through a desktop study of the strategic environmental assessment and complementing documents. Semi-structured interviews were held with the stakeholders of the ecosystem services in the area about the benefits they receive and their perception of these. The results from the interviews are subsequently categorized using template analysis into the sub-values of total economic value: use value, indirect use value, option value, altruist value, bequest value and existence value. The results showed that the ecosystem services are connected through their biophysical structures as well as their stakeholders. This showed it is important to keep a holistic view when doing an assessment on the impact on ecosystem services as they are all connected and embedded in society. Furthermore, it showed that it was difficult for the stakeholders to relate to some of the values that comprise the total economic value. The qualitative methods also allowed for nuance and context in the description of values, contrary to the well-known economic assessments. The suggestions based on this case study are to continue research into alternative methods of assessing ecosystem services in strategic environmental assessment. It is further recommended that this research looks into using interdisciplinary methods to ensure that the method is all encompassing.

Keywords: sustainable development, ecosystem services, strategic environmental assessment, qualitative assessment, total economic value

Alies Joanne van Rhijn, Department of Earth Sciences, Uppsala University, Villavägen 16, SE- 752 36 Uppsala, Sweden
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Summary: This thesis is about exploring the use of a qualitative method to assess the impact of the implementation of a detailed development plan on ecosystem services and their stakeholders through a case study. Ecosystem services are the services delivered by ecosystems that support human well-being and they are under threat by human development. The integration of ecosystem services into strategic environmental assessment aims to halt the degradation of ecosystem services. Strategic environmental assessment is the environmental assessment that is done to see what the possible impacts of the implementation of a plan on the environment may be. The case study that was used to conduct this study is for the strategic environmental assessment for the detailed development plan for the P18 area in Visborg, Gotland. The plan earmarks the area for sports and recreation and allows for the building of a sports hall, rerouting of the running tracks and the discontinuation of the motocross circuit. The study evaluates the impact of the implementation of the plan on ecosystem services and how this affects their stakeholders.

A desktop study of the strategic environmental assessment and other documents that were handed in together with the detailed development plan is used to identify the ecosystem services that may be impacted. Through conducting semi-structured interviews with the stakeholders of the ecosystem services it was researched how the stakeholders may be impacted by the effects of the implementation of the plan on the ecosystem services. The results from these interviews were then categorized using the economic concept of total economic value. This is a concept that is used to describe total environmental value in which tradable as well as non-tradable values are taken into account. The sub-categories of total economic value have two major groups: use value and non-use value. The use values are about the benefits that are received that are tradable, while the non-use values relate to for example the satisfaction of knowing future generations can benefit from the environmental asset.

The results showed that the ecosystem services are connected through their environmental and physical structures as well as by their stakeholders. The impact on one ecosystem service may thus subsequently impact other ecosystem services and their stakeholders. Thereby the results showed that having a holistic view over the results can provide important insights into the impact of the implementation of a plan on ecosystem services and their stakeholders. Furthermore, the results reflected that it is difficult sometimes for stakeholders to relate to what kind of value an ecosystem services may have for them. The use of interviews did allow for nuance and context in the description of values which provides a more accurate description of the way the benefits are perceived by the stakeholders.

The recommendations made based on this case study is to continue research into alternative methods of assessing ecosystem services in strategic environmental assessment. It is further recommended that this research looks into using methods that combine different disciplines to ensure that the method is comprehensive.

Keywords: sustainable development, ecosystem services, strategic environmental assessment, qualitative assessment, total economic value

Alies Joanne van Rhijn, Department of Earth Sciences, Uppsala University, Villavägen 16, SE- 752 36 Uppsala, Sweden
# Table of Contents

List of Abbreviations .................................................................................................................. iii
List of Concepts ............................................................................................................................ iii

1. Introduction ........................................................................................................................................ 1
   1.1 Aim & Research Questions .............................................................................................................. 2
   1.2 Scoping ......................................................................................................................................... 2
   1.3 Methods ....................................................................................................................................... 2
   1.4 The case ....................................................................................................................................... 2

2. Background .................................................................................................................................... 3
   2.1 Ecosystem services in Sweden ...................................................................................................... 4
      2.1.2 Swedish conservation of ecosystem services ................................................................. 5
   2.2 Valuation of ecosystem services .................................................................................................. 5
      2.2.1 Monetary valuation .............................................................................................................. 5
      2.2.2 Qualitative assessment ...................................................................................................... 7
   2.3 Strategic Environmental Assessment .......................................................................................... 7
      2.3.1 EU Directive 2011/92 ......................................................................................................... 7
      2.3.2 Swedish Environmental Code .............................................................................................. 8
      2.3.3 Guidelines for Strategic Environmental Assessment ....................................................... 8
      2.3.4 Ecosystem Services in SEA in Sweden ............................................................................... 9
      2.3.5 Guidelines on incorporating biodiversity in SEA ............................................................. 10
   2.5 Reflection on background ............................................................................................................ 11

3. Conceptual framework .................................................................................................................... 12
   3.1 Anthropocentric worldview ....................................................................................................... 12
   3.2 Eckersley’s social construction of nature .................................................................................... 12
   3.3 Sustainable Development ......................................................................................................... 13

4. Approach & Methods ...................................................................................................................... 14
   4.2 Methods ..................................................................................................................................... 14
      4.2.3 Desktop study ...................................................................................................................... 15
      4.2.5 Template Analysis.............................................................................................................. 16

5. Sports complex in Visborg, Gotland ............................................................................................. 17
   5.1.1 Cultural heritage .................................................................................................................... 20
   5.1.2 Natural environment ............................................................................................................... 20
   5.1.3 Recreation and tourism ......................................................................................................... 21
   5.1.4 Health and safety .................................................................................................................. 21
   5.1.5 Water quality ....................................................................................................................... 22
   5.2 Identified ecosystem services and their stakeholders ............................................................... 22
      5.2.1. Residents of Djuplanda ..................................................................................................... 22
      5.2.2. Atheneskolan .................................................................................................................... 22
      5.2.3. P18 IK ................................................................................................................................. 22
      5.2.4. CAB Animal & Nature ..................................................................................................... 23
      5.2.5. CAB Environment & Water ............................................................................................. 23
      5.2.6 Swedish Society for Nature Conservation ................................................................. 23
5.2.7 Gotland Ornithological Society ................................................................. 23
6. Results ............................................................................................................. 24
6.1 Water supply ............................................................................................... 24
  6.1.1 Baseline value ...................................................................................... 24
  6.1.2 Effects of the plan ............................................................................... 24
6.2 Refugium function ....................................................................................... 25
  6.2.1 Baseline value ...................................................................................... 25
  6.2.2 Effects of the plan ............................................................................... 26
6.3 Pollination .................................................................................................... 27
  6.3.1 Baseline value ...................................................................................... 27
  6.3.2 Effects of the plan ............................................................................... 27
6.4 Education ..................................................................................................... 28
  6.4.1 Baseline value ...................................................................................... 28
  6.4.2 Effects of the plan ............................................................................... 29
6.5 Aesthetic information .................................................................................. 30
  6.5.1 Baseline value ...................................................................................... 30
  6.5.2 Effects of the plan ............................................................................... 31
6.6 Recreation .................................................................................................... 32
  6.6.1 Baseline value ...................................................................................... 32
  6.6.2 Effects of the plan ............................................................................... 33
6.7 Reflection on results ................................................................................... 34
7. Discussion & Conclusion ............................................................................... 37
7.1 Reflections ................................................................................................... 38
8. Bibliography .................................................................................................. 39

Table of Appendices
Appendix 1.1 Interview Guide: Residents of Djuplunda ........................................ 1
Appendix 1.2 Interview Guide: Atheneskolan .................................................... II
Appendix 1.3 Interview Guide: P18 IK ................................................................. III
Appendix 1.4 Interview Guide: CAB Animal & Nature ........................................ IV
Appendix 1.5 Interview Guide: CAB Environment & Water ............................... IV
Appendix 1.6 Interview Guide: SSNC ................................................................. V
Appendix 1.7 Interview Guide: Gotland Ornithological Society ........................... VI
Appendix 2.1 Interview Summary: Residents of Djuplunda ................................... VII
Appendix 2.2 Interview Summary: Atheneskolan .............................................. X
Appendix 2.3 Interview Summary: P18 IK ......................................................... XIV
Appendix 2.4 Interview Summary: CAB Animal & Nature .................................. XV
Appendix 2.5 Interview Summary: CAB Environment & Water ........................ XVI
Appendix 2.6 Interview Summary: Swedish Society for Nature Conservation ........ XVII
Appendix 2.7 Interview Summary: Gotland Ornithological Society ...................... XVIII
List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAB</td>
<td>County Administrative Board</td>
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<td>CBD</td>
<td>Convention on Biodiversity</td>
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<td>COP</td>
<td>Conference of the Parties</td>
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<td>EC</td>
<td>European Commission</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>EU</td>
<td>European Union</td>
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<td>MA</td>
<td>Millennium Ecosystem Assessment</td>
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<td>SEA</td>
<td>Strategic Environmental Assessment</td>
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<td>SEPA</td>
<td>Swedish Environmental Protection Agency</td>
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<td>SIA</td>
<td>Social Impact Assessment</td>
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<td>SSNC</td>
<td>Swedish Society for Nature Conservation</td>
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<tr>
<td>TEEB</td>
<td>The Economics of Ecosystems and Biodiversity</td>
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<td>TEV</td>
<td>Total Economic Value</td>
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<td>UNEP</td>
<td>United Nations Environment Program</td>
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</table>

List of Concepts

Nature
“The phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations” (Oxford Dictionaries, 2014)

Park
“A large public garden or area of land used for recreation.” (Oxford Dictionaries, 2014)

Wild
“Living or growing in the natural environment; not domesticated or cultivated.” (Oxford Dictionaries, 2014)

Wilderness
“An uncultivated, uninhabited, and inhospitable region.” (Oxford Dictionaries, 2014)

Wilderness feeling
The feeling that an area is “uncultivated, uninhabited” (Oxford Dictionaries, 2014) although that may not be the case.
1. Introduction

Ecosystem services, defined as the benefits people receive from ecosystems, can be conceptualized as the relations that exist between nature and society (Hodgson, et al., 2007). The world’s population is dependent on the goods that ecosystems services supply, such as wood and food. Additionally, ecosystems services can have other roles such as, purifying water, providing flood protection and more (Daily, 1997). While the dependence of human well-being on ecosystem services is becoming increasingly clear, the ecosystems and biodiversity supporting these services are under threat due to human development (Millennium Ecosystem Assessment, 2005). Various international initiatives are attempting to mitigate the further degradation and loss of ecosystem services through conserving and researching ecosystem services on a global and local scale (CBD, n.d. a) (Millennium Ecosystem Assessment, n.d.).

The Convention on Biodiversity (CBD) is an initiative that aims to halt the loss of biodiversity in a local setting through global cooperation. By ratifying the CBD a country agrees to conserve biodiversity, sustainably use components of biodiversity and fairly and equitably share the benefits arising from biodiversity (CBD, n.d. a). Sweden ratified this conventions in 1993 (CBD, n.d. c) and is thus obliged to attempt to halt the loss of biodiversity and destruction of ecosystem services (CBD, n.d. b). One of the tools suggested by the CBD to protect the nature from human development is the strategic environmental assessment (SEA) (CBD, n.d. b). If a plan or program is deemed to have significant environmental impact, an SEA has to be prepared in which the environmental effects of the implementation of the plan or program are discussed. It is determined in the environmental law which environmental factors have to be considered in an SEA, however, ecosystem services is not yet one of these factors (Swedish Code of Statutes, 1998). This is to change by 2018 when it will be required to integrate ecosystem services in SEA in Sweden, which is one of the objectives proposed in a report issued by the Swedish government. In this report the goal to make ecosystem services more visible in society was presented (SOU 2013:68, 2013, p. 17).

Although SEAs often already discuss many of the biophysical and socio-ecological components of ecosystem services, these components are hardly ever combined to explicitly discuss ecosystem services. This means that the value that ecosystem services have for society is not discussed in SEA so far (Honrado, et al., 2013). It is thus hard to find examples of SEA where ecosystem services have been integrated, which makes it difficult to say how it will improve strategic decision making (Honrado, et al., 2013; Wärnbäck, 2013). However, it is expected that through the integration of ecosystem services, for example, better economic decisions can be made and that livelihoods can be safeguarded (Commission for Environmental Assessment, 2006, pp. 50-53). Above all, including ecosystem services in SEA may avoid negative impacts on human well-being which may incur high costs for society (DAC Environet, 2008).

Monetary, qualitative as well as quantitative methods have been mentioned as possible ways of discussing ecosystem services in SEA in Sweden, however more research into an appropriate method has been called for (SOU 2013:68, 2013, p. 206). There is much research on monetary valuation however, there is also a lot of critique on this method (SOU 2013:68, 2013, p. 207; O’Neill, 1997; Kumar & Kumar, 2008; Busch, et al., 2012). For example, pricing methods are heavily criticized for not always supplying results that correctly reflect the value (Busch, et al., 2012; O’Neill, 1997; Kumar & Kumar, 2008). This is partially because participants of such studies are often unable to put a reasonable price on the service since they have little knowledge of the topic (Hausman, 2012). Furthermore, economic valuation has been said to be unable to include social equity and sustainability in its assessment (Kumar & Kumar, 2008). The value concept used in monetary valuation is total economic value (TEV) which takes into account tradable as well as non-tradable benefits of ecosystem services. However, not all of the sub-categories of TEV can be properly valued resulting in inaccurate results. Above all, economic valuation focusses on particular parts and thereby loses the view on the interdependency of the ecosystems and their services (Kumar, et al., 2013). However, despite the many limitations of economic valuation it does provide clearly sorted information to the decision maker (de Groot, et al., 2002).

Qualitative assessment is an alternative method in which the goal is to look how direct drivers of change cause changes in socio-ecological systems (Busch, et al., 2012). The main focus of this thesis therefore lies in combining the benefits of economic valuation with the more comprehensive qualitative assessment in an SEA. One of the strong concepts of monetary valuation is TEV and in order to eliminate the inaccuracies in pricing, qualitative data is used instead to describe the values of TEV. The qualitative data can thus in its turn provide a holistic overview of the interdependencies of the ecosystem services and their values to society (Tuvendal & Elmqvist, 2011; Busch, et al., 2012; Hausman, 2012).
1.1 Aim & Research Questions

The aim of this research thesis is to explore the use of qualitative methods to evaluate the impact on ecosystem services in a strategic environmental assessment. To this end the following research questions are explored in this research thesis:

1. What values do the benefits of the ecosystem services hold for the stakeholders?
2. How are the stakeholders and the values affected by the execution of the detailed development plan?

In order to answer these research questions, the following four research objectives are proposed, which are followed during the research:

1. To conduct a case study of an approved SEA on what the value of the ecosystem services are that are present in the area
2. To conduct interviews on the way stakeholders relate to the ecosystem services with a sample of stakeholders of the ecosystem services
3. To systematize the expressions of value or appreciation of the ecosystem services in the interviews using thematic analysis
4. To evaluate the results of the interviews and thematic analysis to assess the impact on the stakeholders of the ecosystem services analysis

1.2 Scoping

The scope of this project is limited to the time limits imposed by the master thesis course, at Uppsala University, during which this research is conducted and the thesis is written. The research is a single case study that considers the impact on ecosystem services in strategic environmental assessment through a qualitative description of the total economic value of the present ecosystem services. The study is limited to one SEA done for detailed development plans which has already been approved by the Country Administrative Board. Since the research is retrospective and limited to one SEA, the thesis is not aimed at making general conclusions about the aptness of qualitative assessment as method to assess the value of ecosystem services in SEAs in Sweden. The thesis is thus of an exploratory nature.

The study is limited to provisioning, regulating and cultural ecosystem services that may be impacted, positively or negative, due to the implementation of the detailed development plan. The main area of study is the plan area as is described in the detailed development plan. In some cases surrounding areas are brought up for discussion if the scale of the ecosystem service is larger than the plan area.

1.3 Methods

Through conducting a case study of an SEA for a detailed development plant, the use of qualitative methods to assess ecosystem services in SEA is explored. The values of the ecosystem services are researched through conducting interviews with the services’ respective stakeholders and using template analysis to categorize descriptions of the benefits and values into the value categories of total economic value (TEV).

1.4 The case

The chosen case study is the SEA that was prepared for the detailed development plan for Visborg, Gotland. The area P18 in Visborg is to become the sports and recreational area of Visby with the implementation of the plan. Examples of the proposed components of the plan are, among others, the building of a sports hall and a road and the replacement of the running tracks in the area (Forsemalm, 2011). The plan area is now dominated by pine forest and the SEA identifies several environmental impacts that may result from the implementation of the plan (Sandström, 2012).
2. Background

The study of ecosystems is a relatively new science despite ecosystems being building blocks to life on earth. In 1935, ecosystems were first conceptualized scientifically by Arthur Tansley, after which the first quantitative study was conducted in 1942 by Lindeman. Only a decade later was the first book published which was based on the ecosystem concept (Millennium Ecosystem Assessment, 2003).

Ecosystems are now commonly defined by the Convention on Biological Diversity (CBD) as: “a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit” (Millennium Ecosystem Assessment, 2003). The services supplied by these functional units known as ecosystems are ecosystem services, which human well-being depends heavily on. Benefits well known from these services are food, fresh water or flood protection for example, but they also offer educational or spiritual benefits (Millennium Ecosystem Assessment, 2003). Figure 1 shows how ecosystems provide benefits to human well-being through ecosystem services. Ecosystems have certain structures and or processes which in their turn have a function, such as the example used in the figure: the structure of ‘vegetation cover’ has a function of ‘slow water passage’. This function of the ecosystem provides a service, in this case ‘flood protection’, and this service leads to a benefit to human well-being: safety against floods. One service may have multiple benefits to human well-being (de Groot, 2010). The diagram furthermore shows that the interaction between the ecosystem & biodiversity and the human well-being makes an ecosystem service. An ecosystem service thus always has two components: an ecosystem/biophysical side and a human well-being side.

Ecosystem services have been categorized into four different groups of services by the Millennium Ecosystem Assessment (2003): provisioning, regulating, cultural and supporting services. Harvestable goods like fruits, fish and genetic material are categorized as provisioning services. The regulating services are natural processes such as carbon sequestration, water purification and pollination. Spiritual, recreational and cultural benefits are provided by the cultural services. The last category, supporting services, enables the former three services with services such as nutrient cycling and primary production. The last category of services is not directly used by people, but rather indirectly through the first three groups. Dividing the services into different groups allows for equal consideration of each of the first three groups and prevents that only the provisioning service are paid attention to (Commission for Environmental Assessment, 2006).

Since the start of ecosystems as a scientific concept, the importance of ecosystems and their services have increased tremendously, while the impacts of human beings on ecosystems have increased rapidly (Millennium Ecosystem Assessment, 2003). Various international initiatives have been created to research and conserve ecosystem services, the Convention on Biological Diversity (CBD), Millennium Ecosystem Assessment (MA) and the Economics of Ecosystems and Biodiversity (TEEB) are some of the most influential examples.

The first global initiative to conserve ecosystem services is the CBD. The CBD stems from a response of the United Nations Environment Program (UNEP) to the high rate of species extinction that led to the creation of the
Working Group of Experts on Biological Diversity in 1988. In December 1993 the CBD entered into force (CBD, n.d. a); it has now been ratified by 156 countries of which Sweden is one (CBD, n.d. c). At the 10th Conference of the Parties (COP) of the CDB a revised Strategic Plan for Biodiversity was adopted (CBD, n.d. e) of which the basic assumption is that biodiversity underpins the provision of ecosystems services. Biological diversity is a structural feature of ecosystems, but at the same time is the diversity found between the ecosystems an element of biodiversity (Millennium Ecosystem Assessment, 2003). The plan aims to ensure that ecosystems are resilient by 2020 (CBD, n.d. b).

As a result of the initiatives that resulted from the CBD, a general realization surfaced that there was a need for an assessment that would show whether the CBD’s measure had any success. Between 1999 and 2000, the CBD endorsed the Millennium Ecosystem Assessment (MA) as the mechanism to meet their assessment needs and in 2001 the MA was formally publicly launched. The reports produced by the MA give an overview of the conditions of the world’s ecosystems and their service (Millennium Ecosystem Assessment, n.d.).

The study on The Economics of Ecosystems and Biodiversity (TEEB) is a result of a meeting of the G8+51 environment ministers in 2007. The European Commission has strongly supported the initiative and is one of the largest donors (European Commission, 2014). The study “evaluates the costs of the loss of biodiversity and the associated decline in ecosystem services worldwide, and compares them with the costs of effective conservation and sustainable use. It intends to raise awareness of the value of biodiversity and ecosystem services and to facilitate the development of cost-effective policy responses and better informed decisions” (ibid.).

2.1 Ecosystem services in Sweden

Globally, the ecosystem services are under threat, despite the efforts of the countries that have ratified CBD. As part of the CBD, the Ministry of the Environment issued a report in 2009, the fourth national report, on biodiversity in Sweden. This is a follow up report on the 1994 report on the threats to biodiversity and since then 6 main ecosystems have identified in Sweden: agricultural ecosystems, forest ecosystems, inland waters, wetlands, marine ecosystems and mountain ecosystems. For each of these the condition was determined and main threats identified (Ministry of Environment, 2009).

The agricultural ecosystem was determined to be under threat as the intensification of farming has an adverse effect on the productivity of the ecosystem services present in agricultural land. Trends such as the abandonment of semi-natural grassland, lead to the extinction of management dependent species. Furthermore, a process of fragmentation also threatens the biodiversity of the agricultural ecosystem. The forest ecosystems are under threat due to the intensification of the forestry business. Production forests are not capable of maintaining a high biodiversity and thus many ecosystem services’ productivity has diminished. Other factors threatening the forest ecosystems include fragmentation, lack of natural disturbances, neglected aquatic environments and lack of dead wood (Ministry of Environment, 2009).

Three of the main ecosystems identified are aquatic ecosystems: inland waters, wetlands and marine ecosystems. The inland water ecosystem are mostly affected by the use of the lakes and rivers for hydropower, but other drivers of change are transportation and agriculture. These activities, among others, lead to fragmentation, eutrophication and acidification, greatly disturbing the ecosystems. A problematic factor with the degradation of water quality is that the biological response to an improvement in the water quality is very slow and therefore threatened species do not recover easily (Ministry of Environment, 2009, pp. 31-34). The wetlands are under threat by agriculture as well, both through drainage and through eutrophication. The wetlands are recognized to have great cultural value, as well as biological diversity and ecological functions. In the South, large effort is put into restoring the wetlands, resulting in positive effects, while in the North negative trends can still be seen in terms of ecological functions and biodiversity. Already a quarter of the wetlands have disappeared and one-fifth is under great threat of destruction (ibid.). The marine ecosystems are under even greater threat than the inland waters and wetlands. The Baltic Sea, Kattegat and Skagerak are all suffering greatly from human activities. The main threats are identified as over-fishing, eutrophication, oil transport, boat traffic, heavy pressure of development and increased population pressure. Many once abundant species are endangered or have already gone extinct despite the actions taken, many of the threats listed above continue unabated making the marine ecosystem a sensitive ecosystem (Ministry of Environment, 2009).

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1 The G8+5 consists of the countries in the Group of Eight (France, Germany, Italy, the United Kingdom, Japan, the United States, Canada, and Russia) and five countries with emerging leading markets (Brazil, China, India, Mexico, and South Africa) (Laub, 2014).
The sixth main ecosystem is the mountain ecosystem, which is doing relatively well. The main threat that is listed is the erosion that is created by driving on snow-free ground and climate change. However, more research on topics such as noise and soil damage and the Sami cultural heritage is needed to improve the understanding of the ecosystem (Ministry of Environment, 2009).

2.1.2 Swedish conservation of ecosystem services

In August 2012, the Swedish Ministry of Environment set the goal to have a method to value ecosystem services with by 2018. This followed from a goal set under the CBD to make biodiversity visible, integrate it into planning processes and into the national accounting. It was recognized that the year 2018 was too ambitious for such a complicated issue and that monetary valuation is not sufficient and that there should therefore be more research into qualitative assessment. Despite this, it was decided that the goal year could be achieved through cooperating with international initiatives. Furthermore, the economic valuation was of deemed of utmost importance as it has the ability internalize external costs (Ds 2012:23, 2012, pp. 161-164).

So far, the Swedish Environmental Protection Agency has produced a compilation of the knowledge of ecosystem services and their valuation methods. In 2013, an investigation was presented to the Ministry of Environment that proposed steps to fulfill the agreements of the CBD. One of the results of this was proposal to obligate the discussion on impact on ecosystem services in SEA; which will be discussed further in section 2.4.

2.2 Valuation of ecosystem services

As can be seen in figure 1, ecosystem services have two sides, first, the actual biophysical structure that has a function and the service that this service provides and, second, the benefits provided to human well-being. The service’s quality depends on the productivity of the function and it is thus important to discuss the function when attempting to value the service. The function or biophysical structure can in some cases be measured, like counting birds measure the bird population. A lot of research has been done by institutions such as the CBD and the MA in order to develop measures and indicators for biodiversity, ecosystem change and ecosystem services. Examples of different measures of the biophysical structure and function are land cover change, net primary production or genetic diversity. Measures of the services they provide include fisheries production or harvested medical plants for provisioning services. Carbon sequestration and pollination are measures for regulating services, while recreational use and aesthetic values are measures of cultural services. The measures of cultural services are those least developed (Reyers, 2010).

It is with the second side, the side of human well-being (see figure 1), that the value of the service for society becomes a relevant topic. The consumption of a service is a human centered process which is driven by the socio-economic situation (Reyers, 2010). The underlying assumption of valuing the service is that “society can assign values to ecosystem services and biodiversity only to the extent that these fulfill needs or confer satisfaction to humans either directly or indirectly” (Pascual & Muradian, 2010).

2.2.1 Monetary valuation

According to the TEEB (Pascual & Muradian, 2010, p. 9), the preference based (monetary) valuation is one of the two distinguishable paradigms in valuing ecosystem services and biodiversity. The other is a quantitative assessment according to the biophysical approach, examples being the ecological footprint analysis and emergy analysis. The TEEB focusses on the monetary or economic preference based valuation of ecosystem services, instead of the biophysical approach. The fundamental idea behind putting an economic value on ecosystem services is that economic performance and human well-being is based on ecosystem services. However, the value that these services add is not reflected in the current economic system showing a structural flaw in the economy. Pricing ecosystem services would reflect for society what the effect human decisions have on the value of ecosystem services in monetary units. A result is that this can be incorporated into the decision making process (Pascual & Muradian, 2010).

The framework of value used by the TEEB is Total Economic Value (TEV), which is a concept used by (environmental) economists to describe the total environmental value comprised of the use and the non-use value of nature (Turner, 2003, p. 4). Figure 2 shows the various sub-categories that have been proposed for both the use and non-use value of ecosystem services (Pascual & Muradian, 2010, p. 14).

There are three different use values. The direct use value of an ecosystem service is related to the direct use of a service, such as the production of timber or eating a fruit (Edwards & Abivardi, 1998, Hein, et al., 2006). However, this includes also the use of the service for tourism. The indirect use value will is on the other hand
related to more secondary benefits, such as pollination (Pascual & Muradian, 2010). Another use value is option value, although this is related to being able to enjoy the personal benefit of an ecosystem service in the future. This can be related to an ecosystem being habitat to a plant of which in the future it could be learned to have healing powers or to a potential visit to a national park in the future (Edwards & Abivardi, 1998).

The non-use values can as well be divided up in three sub categories. The bequest value is similar to the option value, but it relates to the value of the knowledge that future generation will also have access to the service (Pascual & Muradian, 2010, Edwards & Abivardi, 1998). The altruistic value is the value that is based on the satisfaction of knowing other people can able to use the ecosystem services. The last non-use value is the existence value which is assigned to the satisfaction of knowing of the existence and continued existence of an ecosystem service (Pascual & Muradian, 2010), which can be motivated by sympathy for nature (Edwards & Abivardi, 1998).

There are three main approaches to value ecosystem service within this value framework: market valuation, revealed preference and stated preference. The first two approaches can only measure the direct and/or indirect value both are thus limited and cannot measure the TEV. Stated preference valuation, however, can value the use and non-use value. The four methods within this approach are contingent valuation, choice modelling, and deliberative group valuation (Pascual & Muradian, 2010). The contingent valuation method is a popular method which uses “questionnaires to ask people how much they would be willing to pay to increase or enhance the provision of an ecosystem service, or alternatively, how much they would be willing to accept for its loss or degradation” (ibid.). According to neo-classical economists, the use of money in our society is used as a reflection of the utility, satisfaction or pleasure that we believe something to have. For example, if we buy a bottle of wine of 100 SEK, then this means that we are willing to trade of the utility, satisfaction or pleasure of this wine against 100 SEK worth of other things. Money, according to the economic model, is thus a measure of how much we value things and reveals our preferences (Farber, et al., 2002).

In a stated preference valuation, the values of all the categories could be added up to show one price to represent the economic value of the ecosystem service (Hein, et al., 2006). However, the methods have received a wide variety of criticism (Busch, et al., 2012; Edwards & Abivardi, 1998; Hausman, 2012; Kumar & Kumar, 2008; Tuvendal & Elmqvist, 2011). For example, the direct use value is the only value which can easily be put into monetary terms as they make a clear contribution to the economy. The other categories, however, are more difficult to price (Edwards & Abivardi, 1998). And the non-use values are particularly difficult to put a number on (Tuvendal & Elmqvist, 2011). This can in part be attributed to the fact that these three values have various overlapping characteristics and are difficult to differentiate between. Additionally, it is difficult to put religious or bequest values in monetary figures (Pascual & Muradian, 2010). However, even within the use value studies have shown that people find it difficult to assess the price. This can be explained by the fact that people cannot comprehend the value of a fish population the way that they can value a bottle of wine (Farber, et al., 2002). A study by Kahneman showed that the respondents in a stated preference study are insensitive to the scope of the ecosystem service, as people were willing to pay the same amount for saving the fish populations in a small area of Ontario as for saving the fish population in the whole of Ontario (Pascual & Muradian, 2010).

![Tree-diagram showing the sub-categories of use and non-use value adopted by the TEEB (based on Pascual & Muradian, 2010, p.14)](image-url)
2.2.2 Qualitative assessment

The use of the ecosystem service is anthropocentric (Reyers, 2010) and it is those that benefit that benefit from the services that can value them (Pascual & Muradian, 2010). It is the user or stakeholder of the ecosystem service that is thus in the end impacted by the change in the ecosystem service. As the value of ecosystem services reflect the interrelationship between ecosystems and human activities, the value is multidimensional (Busch, et al., 2012). Consequently, different stakeholders will have different associations with the ecosystem service and may thus assign a different value for a different reason (More, et al., 1996; Tuvendal & Elmqvist, 2011). A qualitative approach can offer a more complete view of the ecosystem service as it can incorporate more sides of the issue than a quantitative or monetary valuation, since it leaves room for description and context (Busch, et al., 2012; Hausman, 2012).

An example of a qualitative assessment of the impact of a change in ecosystem services for its stakeholders is the study of Tuvendal & Elmqvist (2011). The authors did an interdisciplinary case study on the effects of river brownification\(^2\) on ecosystem services and partially use a qualitative assessment. The effect of the brownification on the ecosystem services’ biophysical structure and function was studied through a quantitative assessment, while the effects of the impacts on the ecosystem services on the stakeholders downstream was studied using a qualitative assessment.

The brownification was put in an additional perspective of the possible additional drivers that may influence the stakeholders, such as traditions, and the abilities of the stakeholder to change. The study focused on the perception of the benefits of the ecosystem service. The benefits were identified through a scoping exercise with representatives of local authorities. A semi-structured interview approach was subsequently used to discover “(1) the respondents’ operation, experience, and local ecological knowledge, (2) the consequences of brownification […] and (3) strategies to cope with this disturbance” (Tuvendal & Elmqvist, 2011). Using inductive coding, the data from the interviews were categorized which formed the basic structure for the analysis. The authors then used a resilience framework to analyze the data received from the interviews (ibid.).

2.3 Strategic Environmental Assessment

The Environmental Impact Assessment (EIA), which was introduced prior to the Strategic Environmental Assessment (SEA), could originally be defined as a “a process of identifying and predicting the potential environmental impacts … of proposed actions, policies, programmes and projects and communicating this information to decision makers before they make their decisions on the proposed actions” (Harvey (1998) as cited in Vanclay, 2004, p. 268). The Environmental Impact Assessment (EIA) was formally introduced with the implementation of the National Environmental Policy Act in 1969 in the US. In 1985, a directive was introduced in the European Commission that was to give a procedure for the execution of an EIA (Glasson, et al., 2005, p. 29). Originally, the EIA was meant to be applied for project as well as plans and programs. However, in practice, EIAs were only prepared for projects and there was little consideration of cumulative effects (Vanclay, 2004). Therefore, the SEA emerged to aid leaders and managers in decision concerning policy, planning and programs. The SEA was introduced in 1992, but only became popular in the late 90s and in 2001 a directive for the SEA was implemented by the European Commission (Vanclay, 2004). The SEA can be defined as “a systematic process for evaluating the environmental consequences of proposed policy, plan or programme initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision making on par with economic and social considerations” (Sadler & Verheem (1996) as cited in Glasson, et al., 2005, p. 358). As the SEA thus concerns a larger scale, it is important to include ecosystem services in the early stages of the development of a program, policy of plan because if overlooked, the implementation may incur high unexpected costs. For example, if the expansion of agriculture increases deforestation this can impair ecosystem services such as water regulation and lead to flooding. So if ecosystem services are overlooked in an SEA, there may be negative side effects on human well-being (DAC Environet, 2008).

2.3.1 EU Directive 2011/92

Much of what is written in the Swedish Environmental Code is decided by EU regulation and directive 2001/42/EC on Strategic Environmental Assessment (SEA), which was implemented in 2001 (European Council (EC), 2001). The EU directive is the minimal requirement so a member state may opt to implement a more

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\(^2\) Brownification is the increased process in which fresh or brackish waters become browner due to the increase of dissolved organic matter (Granéli, 2014).
extensive law. The directive states that an environmental assessment must be done, after which an environmental report is written, in the case that a plan or program is expected to have significant environmental effects. The purpose of the directive is to provide a standard for member states to which they can shape their SEA legislation accordingly. The directive provides the basic structure of the report and the components of the process, as well as it dictates that the “likely significant effects on the environment, including on issues such as biodiversity, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage, landscape and the interrelationship between the above factors” (European Council (EC), 2001, p. 36) are to be discussed. Furthermore, the directive requires a certain level of public consultation in which relevant authorities and the public are allowed sufficient time for consultation, during which also opinions may be expressed (European Council (EC), 2001, p. 31).

2.3.2 Swedish Environmental Code

In Sweden the Planning and Building act determines that in some cases an SEA needs to be prepared for a detailed development plan (Swedish Code of Statutes, 2010). This is supported by the Environmental Code (Swedish Code of Statutes, 1998) which has been in force since 1999 (Naturvårdsverket, 2013). An SEA is to be handed in with the detailed development plan in case a plan or program falls under either of the following chapters (see article 6): article 9: environmentally hazardous activities and health protection; article 11: water activities; article 12: agricultural and related activities; article 7: protected areas and their surroundings and in special cases as pointed out in article 17. According to article 6, paragraph 11 of the Environmental Code, the SEA should discuss the effects on biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, landscape, buildings, archeological and cultural relics and other cultural heritage as well as the interrelationship between these environmental aspects. The Swedish law thus covers all factors that are presented in the EU directive. Furthermore, a consultation period is required during which the involved municipalities, CABs and population may comment on the SEA as well as the plan or program proposal (see article 6, paragraph 14) (Swedish Code of Statutes, 1998).

2.3.3 Guidelines for Strategic Environmental Assessment

The goal of the SEA, according to the Environmental Code, is to integrate environmental factors into the plan or program in order to promote sustainable development. The level of detail that is to be reached in the SEA (article 6, paragraph 13) is determined through a discussion with the CAB and municipality who will be affected by the plan or program. If it concerns a national level, the discussion will be held with the Swedish Environmental Protection Agency, Swedish Agency for Marine and Water Management and other involved national authorities (Swedish Code of Statutes, 1998).

The Environmental Code gives an overview of what is to be included in a SEA report in article 6, paragraph 12 (Swedish Code of Statutes, 1998), of which a translation is given in box 1. The process of the SEA preparation has no clear cut guidelines as it is to be integrated with the formulation of the plan (Commission for Environmental Assessment, 2006), but according to Glasson et al (2005, pp. 374-383) five general steps can be identified. The first step is to set the context and establish the baseline during which the environmental factors are identified, the data on environmental baselines are collected, a description of the links to other plans is given and environmental problems are identified. This step is best carried out in parallel with the formulation of the plan as then a feedback loop can filter out early problem areas and provide alternatives. Lastly, in this first step it is also t be considered whether there are any environmental problems to be taken into consideration, such as not achieving environmental goals (Glasson, et al., 2005, pp. 374-378).

In the second step the scope of the SEA is decided on and alternatives are developed. The alternatives should take into consideration the environmental problems identified in step 1, suggestions made by consultants and finding different ways of satisfying the demand. However, the suggested alternatives should be realistic and meet the plan’s objectives (Glasson, et al., 2005, p. 378). The scope is decided upon by the involved authorities on the appropriate level as is dictated by the Swedish Environmental Code in article 6, paragraph 13 (Swedish Code of Statutes, 1998).

The effects of the plan are assessed on different levels in step three. There are three different levels that are to be considered during this step: the broad strategic level, the more detailed sub-components of the plan and the proposed location for the development (Glasson, et al., 2005, p. 378).
The Strategic Environmental Assessment will include:
1. a summary of the plan or programs contents, the main purpose and relation to other relevant plans and programs,
2. a description of the environmental relations and the environments likely development if the plan, program or changes would not be implemented,
3. a description of the environmental relations in those areas that can be assumed to be impacted significantly,
4. a description of relevant current environmental problems that are connected an environment as described in article 7 or another area with a certain significance to the environment,
5. a description of how relevant environmental objectives and other environmental issues are considered in the plan or program,
6. a description of the significant environmental impacts that can be assumed to arise with regards to biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, landscape, buildings, archeological and cultural relics and other cultural heritage as well as the interrelationship between these environmental aspects,
7. a description of those measures that are planned in order to forestall, prevent or counter the significantly negative environmental impact,
8. a summarizing description of how the assessment is done, which arguments back up the made choices of different alternatives and possible problems in relation to the compiled data,
9. a summary of the arrangements that have been made for the follow up and the monitoring of the significant environmental impact resulting from the implementation of the plan or program,
10. a non-technical summary of the information supplied in points 1-9.

Law (2004:606)

Box 1: A translation of article 6, paragraph 12 of the Environmental Code, which gives an overview of what is to be included in an SEA (Swedish Code of Statutes, 1998).
2.3.5 Guidelines on incorporating biodiversity in SEA

Currently, ecosystem services are not explicitly discussed in SEAs, however, Honrado, et al (2013) propose certain criteria for explicitly discussing ecosystem services in SEA. According to their proposal, the following topics should be taken into account: ecosystems, ecosystem service identification, stakeholders, drivers of change, benefits and valuation. There is, however, no discussion about methods to include these topics (Honoardo, et al., 2013).

Some “voluntary guidelines” are proposed for integrating biodiversity and ecosystem services in SEA in the report “Biodiversity in EIA & SEA” (Commission for Environmental Assessment, 2006). This report was prepared as a background document to a decision made by the CBD and it presents guidelines for SEA as well as EIA (Commission for Environmental Assessment, 2006). The guidelines for how to include biodiversity into EIA are quite clear, as there is an internationally accepted format of the EIA process. The guidelines for the SEA are however not given in a step-by-step fashion, as according to the writers there is no general agreement on what a typical SEA procedure might be. The guidance that the document provides is wholly according to the ecosystem approach and thus promotes a high level of stakeholder involvement (Commission for Environmental Assessment, 2006, p. 47).

There are various arguments for integrating biodiversity in SEA such as the legal obligation to sound economic decision making and from safeguarding livelihoods to the facilitation of stakeholder identification. The latter three reasons are all connected to ecosystem services in their own way. The sound economic decision making argument relates to the economic benefit the society receives from the ecosystem services. The latter two refer to the stakeholders of the ecosystem services. The integration of biodiversity highlights ecosystem services and its stakeholders that benefit from these services. These stakeholders can subsequently be invited to participate in the process, especially in developing countries it is important to identify the poorer stakeholders and actively attempt to involve them in the SEA process in order to protect the services they depend on (Commission for Environmental Assessment, 2006, pp. 50-53). Furthermore, including ecosystem services in SEA may avoid negative impacts on human well-being which may incur high costs for society (DAC Environet, 2008).

The document does not give proper guidelines on how to integrate biodiversity in the process of an SEA, however, it does provide a conceptual framework of the different features of the interaction between biodiversity and the implementation of a plan or program. It is mostly focused on plans or programs of which the geographical location is not yet defined and thus remains vague. The most constructive advice is that “[g]ood participatory scoping and application of the best available scientific and local knowledge results in the identification of most relevant impacts and associated cause-effect chains that need further study” (Commission for Environmental Assessment, 2006, pp. 57-58). The cause-effect chains that are mentioned show how ecosystem services are integrated into society. The execution of the plan may have an effect on the biophysical structure providing the service, thus initiating social- and micro-economic changes, and the decrease in value of the ecosystem service will affect the human well-being (Commission for Environmental Assessment, 2006). The framework thus show that there are two sides to look at when biodiversity or ecosystem services are considered in SEA. On one hand the impact on the ecosystem has to be taken into consideration, while on the other hand the effects on human well-being needs to be taken into account. As these two are interrelated, different cause-effect chains may arise which makes identifying impacts quite challenging.

The document does propose a basic procedure for the identification of biodiversity and ecosystem services that may be affected by the plan. This basic procedure that is proposed is quoted in box 2. Direct drivers of change are defined as “human interventions (activities) resulting in biophysical and social/economic effects with known impacts on biodiversity and associated ecosystem services” (Commission for Environmental Assessment, 2006, p. 54). It thus looks at different the different activities that will be taking place due to the implementation of a plan or program and then connects the different ecosystem services present in the area. The effects on the productivity of the ecosystem are then to be determined and its stakeholders are to be involved in the process.

| 1. Identify direct driver of change and define their spatial and temporal range of influence |
| 2. Identify ecosystems lying within this range of influence (in some cases species or genetic level information may be needed) |
| 3. Describe effects of identified drivers of change on identified ecosystems in terms of changes in composition or structure of biodiversity, or changes in key processes responsible for the creation or maintenance of biodiversity |
| 4. If a driver of change significantly affects their composition, or structure, or a key process, there is very high probability that ecosystems services provided by the ecosystems will be significantly affected |
| 5. Identify stakeholders of these ecosystem services and invite them to participate in the process. Take into account the absent (future) stakeholders |

Box 2: Quoted procedure suggested in the CBD background document Biodiversity in EIA & SEA (2006) for how to integrate biodiversity and ecosystem services in the SEA process. (Commission for Environmental Assessment, 2006, p. 60)
Besides direct drivers of change, there are indirect drivers of change that may affect ecosystem services which are defined as “societal changes, which may under certain conditions influence direct drivers of change, ultimately leading to impacts on ecosystem services” (Commission for Environmental Assessment, 2006, p. 54). Examples of such indirect drivers of change are economic growth or population size, but regarding the interactions that result in impacts on the ecosystems, more research is required. Furthermore, according to the document, indirect drivers of change only have to be taken into account when it concerns an activity that has no biophysical consequences, which trigger indirect drivers of change and consequently impact the ecosystems (Commission for Environmental Assessment, 2006, pp. 60-61). However, only in national overarching strategies, plans and policy reforms do indirect drivers of change predominantly affect ecosystem services. In the case of national sectorial policies, plans and programs, direct drivers of change may impact the ecosystem services. Lastly, infrastructure investments plans it is concern affect ecosystems through direct drivers of change (DAC Environet, 2008).

2.5 Reflection on background

Decision making on development will in the future have to consider the effect on ecosystem services through discussing these in EIAs and SEAs. The Environmental Code dictates what an SEA is to contain, however, there is no general format for the process of preparing an SEA. There is therefore no clear guidance yet on how to integrate ecosystem service in SEA. Furthermore, there is no consent on how to value or assess ecosystem services in documents such as EIA and SEA. The economic valuation of ecosystem service has the benefit of being able to communicate in simple language to decision makers what the impact of a certain activity can be on ecosystem services. However, there is a lot of critique on the widely researched economic valuations as this approach has numerous limitations. A qualitative assessment is able to incorporate the multidimensional sides of ecosystem services, but so far the focus in the research has remained on the economic valuation.

As explained in section 2.3, there are two aspects to ecosystem service, the biophysical structure which has the function that delivers the service and the benefits that can be reaped from this service by stakeholders. In the brownification study by Tuvendal & Elmqvist (2011) this first part was quantified while the impact on the stakeholders was researched qualitatively. This research focuses on the impact on the stakeholders and uses like Tuvendal & Elmqvist (2011) qualitative interviews to explore the relation between the stakeholder and ecosystem service. However, in this research the qualitative data from the interviews is put in an economic framework using the concept of TEV, since the language of economics is clear for decision makers. The research method used is thus interdisciplinary, which fits with the multidimensional character of ecosystem services.

The case that is chosen for this research thesis is the SEA prepared for the detailed development plan for the P18 area in Visborg, close to Visby on Gotland. An SEA for a development plan is chosen as no indirect drivers of change need to be considered. This area is earmarked to be a recreational and sports area and in the plan contains various sub-components which propose development for the area.
3. Conceptual framework

The premises of this thesis are based on a conceptual framework which sets the context of how different issues or concepts are perceived. The anthropocentric worldview which is taken sets the tone for using social constructionism of nature to define from which point of perception the problem of this thesis is discussed. The concept of sustainable development provides a guidance what parts of the problem are to be taken up in this thesis.

3.1 Anthropocentric worldview

To value the environment can mean different things depending on which worldview is taken. When using the concept total economic value an anthropocentric worldview is taken (Reyers, 2010; Pascual & Muradian, 2010). The values that economists assign are inherently anthropocentric as they are based on the instrumental value that gives people utility, satisfaction or pleasure. As TEV is used as a categorization of the value of the ecosystem services, an anthropocentric stance is taken in this thesis.

This is not to say that nature or ecosystems itself do not hold intrinsic value in their natural states (Goulder, 1997). However, since the observed ecosystem functions are conceptualized as ecosystem services as “it is the presence of human beings as valuing agents that enables the translation of basic ecological structures and processes into value-laden entities” (de Groot, et al., 2002). This makes ecosystem services inherently anthropocentric, while ecosystems in itself possess an intrinsic value as well as an instrumental value.

Furthermore, by integrating ecosystem services in SEA another perspective is taken within the SEA. The SEA focuses on the impact of human actions on nature, while the consideration of ecosystem services looks at how that impact on nature in its turn affects humans and society (Wathern, 2004). However, since this thesis focusses on ecosystem services and the benefits that they have for society and their stakeholders, an anthropocentric perspective is taken and it is assumed that ecosystem services only hold instrumental value.

3.2 Eckersley’s social construction of nature

According to social constructionism, nature is merely a set of culturally generated symbols. This strongly opposes the view of the realists in which nature is purely the material conditions of our existence (Redclift & Woodgate, 1997, p. 61). The problem of social constructionism’s notion of nature is that “its rejection of the biological determinism and evolutionary theories distances the sociological theories from nature” (Redclift & Woodgate, 1997, p. 59). Furthermore, a key issue of the conceptualization of the environment and environmental change is “whether and how it is appropriate to conceptualize the biophysical environment in social-psychological, symbolic, social constructionist or perceptual term, as opposed to an objectivist or highly material sense of the environment as a source of resource, a set of systems that provide ecosystem services, and site of human habitation” (Buttel, 2010, p. 35). The ecosystem service is the conceptualization of the nature-society relation. The definition of the concept of ecosystem services clearly links the properties of ecosystems to the state of human wellbeing (Hodgson, et al., 2007). Furthermore, it is recognized that the degradation of ecosystem services is a result of the rising demand on them by humans (Dunlap, 2010, p. 18). Ecosystem services and the human wellbeing are thus strongly intertwined. The social construction of the problem of degrading ecosystem services could then bring up the fact that there are still ecosystem services but that current demand dictates that we need more of these services, which is in its turn making the ecosystem services insufficiently productive.

The 21st century sees various efforts to integrate constructionism and realism and move beyond this divide (Hannigan, 2006, p. 33). Eckersley’s view bridges the divide stating that the objective knowledge we have about our world (realist knowledge) is always potentially vulnerable to challenge and change because the knowledge is historically and culturally specific. Eckersley additionally states that it cannot be said that there is no nature beyond the socially constructed nature (Hannigan, 2006, p. 34) and thereby accepts a bit of realism into her view.

This thesis adheres to Eckersley’s view on the social construct of nature by both considering the realism and the social constructionism side of the impact of the execution of the detailed development plan on the present ecosystem services. The impact on the productivity of the ecosystem services, the realist impact, is used the basis for the research into what the impact is on the values of the ecosystem services assigned by the stakeholders, the socially constructed value assigned to the ecosystem services.
3.3 Sustainable Development

The concept of sustainable development runs as a red thread through this research. The first paragraph of article 1 of the Swedish Environmental Code explains that its purpose is to promote sustainable development and to ensure the current and future generations of a proper and healthy living environment (Naturvårdsverket, 2013). The strategic environmental assessment is a tool to achieve sustainable development (Vanclay, 2004). Furthermore, the maintenance of healthy ecosystem services is vital for sustainable development (Millennium Ecosystem Assessment, 2003). Including the discussion of ecosystem services in EIA and SEA is thus key to achieving sustainable development.

Elkington was the first to coin the *triple bottom line* of sustainable development in 1997 as people, planet and profit (Elkington, 2004). In 1997, the EU adopted the three pillars of sustainability to be social systems, economic systems and ecological systems, thereby adhering to the triple bottom line (Goethe Institute, 2008) (European Commission, 2012). Ecosystem services are the reflection of the interaction between ecology and our economy and society and vital to reaching sustainable development (Millennium Ecosystem Assessment, 2003) (Stratton & Pearson, 2008). The method used in this thesis adheres to this triple bottom line because it looks at how the impact on the ecosystems affect society and its stakeholders and by categorizing the qualitative data using the concept of TEV, it is put in an economic perspective while maintaining the ability to incorporate values that cannot be put into numbers.
4. Approach & Methods

This research falls under the paradigm of qualitative research which aims to capture aspects in the social world, without using numbers as the unit of analysis (King & Horrocks, 2010, p. 7). A common method used in qualitative research is the case study, which in this thesis is used as the main approach. Yin (2003, p. 13) defines case study research as “an empirical study that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. In this thesis the SEA is the real-life context within which the stakeholders’ perceptions of the ecosystem services are researched. Furthermore, ecosystem services are difficult to define since they are part of a complex dynamic between society and nature. The case study approach thus fits the study area of this thesis.

There are various case study designs, where the main distinction lies between the single and multiple case study design (Yin, 2003, p. 39). This thesis adopts a single case study design in order to be able to go deeper into the subject. The case study is of exploratory nature (Yin, 2003, p. 6) because there is not much similar previous research. The unit of analysis is the stakeholder’s perception of value and importance of the ecosystem services.

4.2 Methods

Before the stakeholders’ perceptions of value can be analyzed, the ecosystem services as well as the stakeholders need to be identified. The identification of the ecosystem services is done through reviewing the SEA and the Social Impact Assessment (SIA), which is explained further in section 4.2.1. The identification and selection of stakeholders is explained in section 4.2.2.

The research follows the steps of an SEA as much as possible to be able to relate it to the real-life context of the SEA. Figure 3 gives an overview of the SEA process and how the methods used in this thesis relate to the different steps of preparing an SEA. Not every step of the SEA is addressed in this thesis since some (step 2, 4 and 5) fall outside the scope of this thesis. These steps are depicted in figure 3 with white boxes and grey outlines.

This thesis thus contributes to the SEA preparation process in steps 1 and 3 that discuss the “baseline” and “effects of the plan”. For each step it is chosen to divide the research of ecosystem service into two sub-steps, one that discusses the biophysical structure that provides the ecosystem service and the other one that concerns the stakeholders’ perception of value. The sub-steps “baseline of ecosystem service” and “impact on ecosystem service” research the biophysical structure and the impact on the biophysical structure respectively that provide the ecosystem service. The sub-steps “baseline value” and “impact value” concern the perceptions of value of the ecosystem services by the stakeholder and how these may be impacted. The methods that are used to research each of these sub-steps are depicted in figure 3 with grey boxes and black outlines and include references to the relevant paragraph.

4.2.1 Identification of ecosystem services

The guidance on integrating ecosystem services into SEA given in box 2 (p. 9) is basis for the method used to identify ecosystem services. The first three steps of the guidance are already covered in the SEA where the different direct drivers of change and their environmental impacts are discussed. The fourth step subsequently relates this impact on the environment and ecosystems to ecosystem services.

Figure 4 is an illustration of how ecosystem services are identified in this thesis by checking the impacted environments with two different inventories that have been prepared along with the SEA. The first inventory is the species catalogue of the area which shows where important species live in the plan area (Andersson, 2013). The second inventory is the Social Impact Assessment (SIA) in which the use of the area by society is mapped (Forsemalm, 2011). If a use of the area (by society or a species) coincides with an impacted ecosystem, this indicates the presence of an ecosystem service will be impacted. To check if the suspected ecosystem service has been identified in earlier research as an ecosystem service the following article is used: “A typology for the classification, description and valuation of ecosystem functions, goods and services” by de Groot, Wilson & Boumans (2002). If this is indeed the case, the presence of this ecosystem service is confirmed.

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3 Social Impact Assessment: “includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment”
4.2.2 Stakeholder identification

Since the valuation is stakeholder based, it is important to define what stakeholders are in this study. The basis for someone or a group to qualify as a stakeholder is if this person or group benefits from the ecosystem service that is to be valued (Tuvendal & Elmqvist, 2011; Hein, et al., 2006).

After all ecosystem services are identified, the stakeholders are identified and selected according to the fifth step in the guidance (see box 2, p. 9). The first selection of stakeholders is based on the participation list of the SIA. Those participants that are linked to an ecosystem service through their use of or dependency on an ecosystem service are asked for an interview. Furthermore, authorities or local expert groups that are linked to an ecosystem services through acting as a representative for the well-being of society are selected for interviews as well. These representatives are to represent the absent (future) stakeholders that are to be taken into account according to the guidance in box 2.

4.2.3 Desktop study

A desktop study method is used to gather information on the “baseline of ecosystem service” and “impact ecosystem service” in step 1 and 3, respectively (see figure 3). The baseline

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**Fig. 3:** This diagram depicts an overview of the methods used in this thesis and how the methods relate to the different steps of preparing an SEA which were explained in paragraph 2.5. Those boxes that have a grey outline are those that are not addressed in this thesis as they have either been done in the original SEA or because they fall outside of the scope of this thesis. The white boxes with a black outline are the steps of the SEA where the methods of my thesis contribute to assessing the impact on ecosystem services. The grey boxes with the black outline are subsequently the methods used to collect information on the impact on ecosystem services.

**Fig. 4:** A diagram depicting the review template that is used to identify the ecosystem services that may be impacted by the plan.
information is provided in the SEA and the information provided in the article by de Groot, Wilson & Boumans (2002) is used to define the baseline of the ecosystem service’s biophysical structure. For step 3, only the SEA is used to find out how the biophysical structures will be impacted and if this will improve or impair the ability to provide the ecosystem service.

4.2.4 Interviews
The interviews are used in each sub-step and the interviews thus have different functions (see figure 3). For the sub-step that concerns the (impact on) the biophysical structure providing the ecosystem service, the role of the interview is to confirm the information gathered from the desktop study. The function of the interviews in the other sub-steps, however, is to understand what the value of the ecosystem service is and how it may be affected. The choice of using interviews for this second function can be explained by the following quote: “If you want to know how people understand their world and their life, why not talk to them?” (Kvale, 1996). Since, ecosystem services receive their value from the stakeholders, interviewing is thus the most appropriate method to understand what this value is to them.

Interviews are held with each identified stakeholder, which means that in total 12 interviews are held. The interviews are semi-structured as they allow the interviewee to elaborate and guide the interview into certain direction, while keeping focus on collecting the information that is wanted. It is important that the interviewees have a chance to focus on those issues they find important as to not exclude any valuable information on how they perceive the value the ecosystem services that will be impacted.

For each interview a separate interview guide is prepared that focusses on the relationship the stakeholder is expected to have with the ecosystem services and what kind of values are expected to be associated with that relationship. All interviews have two parts; the first part aims at uncovering the relationship the stakeholder has with the area and starts with general questions about the area and how they use and perceive the area. It is also designed to find out what baseline values the stakeholders would assign to the ecosystem services. The question for this were prepared by looking at the baseline data assembled in the desktop study and assigning values that could be expected to be associated. The second part goes into the detailed development plan and possible effects on the area. In this part the aim is to find out how it would affect the stakeholder or society in some cases. Although it is a semi-structured interview all the questions that need to be answered are fully formulated because the interviews are carried out in the non-native language of the researcher. However, there is space during the interview to lead away from the line of questioning and return later.

4.2.5 Template Analysis
The data collected during the interviews is analyzed using template analysis. In template analysis the data from the interviews are categorized into categories that are predetermined, this is contrary to thematic analysis in which categories are interpretive (Guest, et al., 2013). The use of categorization to structure the data for analysis is based on Tuvendaral & Elmquist (2011) in which thematic analysis was used. It is chosen to use template analysis instead because, this study aims to combine to the advantages of economic valuation with those of qualitative valuation. The predetermined categories are thus those that are the values that comprise total economic value (see section 2.3.1). The advantage of using the categories of TEV is that they can give a clear overview of how the ecosystem services are embedded in society and its economy. This is combined with the advantage of qualitative research being able to cover the multidimensionality of ecosystem services. So, instead of putting a quantifiable number on the different values of the TEV, the values are used as a categorization of what kind of value the stakeholder assigns to the ecosystem service and its benefits. This provides the possibility of including economic as well as ecological value (Farber, et al., 2002).

After the interviews are summarized, the various associations the stakeholders have with the ecosystem services are organized into the different value categories. The associations are those benefits or perceptions the stakeholders have of the area and these are then categorized accordingly. The associations that displayed a use of the service are use values (direct or indirect), while those uses that have not yet been realized or uncovered are option values. Subsequently, the bequest value is related to those benefits that can be enjoyed by future generations, while the altruist or existence value does not have to indicate a use of the benefit, but an appreciation of the use of other people or the sheer presence of it, respectively.
5. Sports complex in Visborg, Gotland

South of Gotland’s largest city Visby, lies Visborg (see figure 5), where the P18 area has been dedicated to recreation, tourism and sports, according to the municipality’s detailed plan (Region Gotland, 2012). The plan area is a 130 hectares and most of the land is owned by the region Gotland. The area in its baseline is dominated by forest, with hardened roads bordering the area north, east and west and some gravel roads and small paths leading through the area. The area is already used for sports, as it has soccer fields, a floorball hall, a jeu de boules field, a running/mountain bike track and motocross circuit. In the surroundings a school, a doctor’s practice, offices and housing can be found. Furthermore, in the area there are several building which have a military origin.

Figure 5 gives an overview of all the different constructions and improvements that fall under the plan. Some plans for the area involve doing maintenance work on the existing facilities in the area. New facilities that will be constructed are the parking lots (2), eastern border barn (5), sports hall (8), skateboard rink (9), affordable housing (10), wind protection and fireplace (11) and outdoor gym (12). Besides these new facilities, a road connecting Toftavägen (Road 140) and Road 142 (see figure 5) will also be built as part of the plan to ensure a good connection to this area. The road will be built where now a gravel road leads through the forest and the sports hall is being built where there was only an open gravel field. The biggest maintenance project is that of the running track whose start/finish sign will be moved south so that it is next to the sports hall.

The municipality of Gotland decided that according to the Swedish Environmental Code, paragraph 6, there would be significant impact on the environment and it was ruled that an SEA was necessary. The SEA was conducted by the Swedish consultancy company Calluna that focusses on securing ecosystems for future generations. The mission statement of the company is based on the pressure that the ecosystems are under pressure due to the land use, urban development and climate change. Calluna aims therefore to find the ecological sustainably solution for any human action (Calluna, n.d.), which fits the aim of this thesis to incorporate ecosystem services in SEA.

Only two alternatives were proposed in the SEA: either the full plan is build or the zero alternative in which no action will be taken and the area will be left the way it is now. Five different environmental aspects were assessed in the SEA: cultural heritage, natural environment, recreation and tourism, health and safety and water quality.

![Fig. 5: Map showing the area of the project plan (Google Maps, 2014) (Region Gotland, 2012)](image)
Fig. 6: Map showing the inventory of the use of the area. (Forsemalm, 2011)
Fig. 7: Map showing the proposals and the conflicts based on the inventory of the use of the area. (Forsemalm, 2011)
5.1.1 Cultural heritage

There are no cultural sites in the area and the impact of the plan was thus assessed to be small. However, in case an antique artefact is found during construction, there will be archeological research (Sandström, 2012, p. 34).

5.1.2 Natural environment

Figure 8 shows the nature values that can be found in the area. There are no Natura 2000 areas, nature reserves, key habitats, wetlands or natural monuments. The area is rich in wild bees which depend on the sandy area of which some are red listed⁴ and there are more red listed species in the pine forest. The area is dominated by pine forest which is classified to have a high nature value due to its size and the variety of red listed species that can found there. The areas marked by red stars are those areas where the largest impact is expected of the plan. The upper red star is where the camping will be situated. The old military barracks will be used as a housing at the camping site, but the surrounding forest will be exploited. In the forest, red listed species such as common slender eyebright and several fungi. The exploitation of the forest may lead to the disappearance of habitats for endangered species. The impacts may be diminished if as few trees as possible are cut down (Sandström, 2012). The lower red star marks the area of the motocross circuit where red listed wild bees live in the sandy grounds of the motocross area. The habitats of the bees depends on the motocross activities as they prevent the track from

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⁴ The International Union for Conservation of Nature is a global environmental organization that has composed a red list of threatened species that shows the state of endangered of species (The International Union for Conservation of Nature, 2014).
overgrowing. It important for the bees that an alternative activity will keep the area open when the motocross is discontinued. The impact on the bees’ habitats depends entirely on the effectiveness of the activity or measure that is taken to keep the area from overgrowing. Furthermore, it is important to keep the bees in the area to maintain the contact of the flora and bees in the area with the flora and bees in the surrounding areas. The sports hall is not marked as an area that will suffer much impact since the sports hall is build where there is currently a large gravel field (Sandström, 2012, pp. 35-37).

5.1.3 Recreation and tourism
As the area is designated for recreation and tourism, the execution of the plan is expected to positively impact this environmental factor. There will be better and more possibilities for recreation. Affordable accommodation will be provided by the camping and the “Dungen” area (see figure 7) which is used much by the school will be maintained (Sandström, 2012, pp. 37-38).

5.1.4 Health and safety
There is a small chance of contaminated soil, but the same risk exists for the zero alternative. There should be no increase in the radon level according to investigation. The sound level is expected to increase due to the new connection road which will impact the people living around the area; however, with the precautions proposed the impact is assessed to be small. The discontinuation of the motocross track will lower the noise from the motocross racing events. With the increased traffic certain precautions will also be taken to ensure the traffic safety, for example, for the children playing in the area or crossing the road when using the running track, but also for the people going to the sport halls. To ensure safety there will be a walking and bike lane along the road and to the sports hall. (Sandström, 2012, pp. 38-41)

![Fig. 9: Water protection area determined by Region Gotland. The blue outlined area is the plan area. (Region Gotland, 2013)](image-url)
5.1.5 Water quality

Gotland’s fractured bedrock makes this aspect quite important as the rainwater easily percolates into the groundwater. The plan area falls into a secondary groundwater protection zone making this an important environmental aspect (see figure 9). Additionally, the residential area Djuplunda (see figure 6) even falls in a primary groundwater protection zone\(^3\), making it even more important to take the right precautions against contamination.

As the precipitation will fall on the buildings and run off on surfaces such as roofs and hardened surfaces, the rainwater may become contaminated before it percolates into the ground. This thus means there is a risk of groundwater pollution. Furthermore, with the increased traffic there is a higher chance of petroleum leakages from the cars.

Proper precautions need to thus be taken in order to ensure that no contaminated water can percolate into the groundwater. It is expected that the impacts will be small if the correct measures are taken. (Sandström, 2012, pp. 41-42)

5.2 Identified ecosystem services and their stakeholders

Using a review template (see 4.2.1), ecosystem services of the provisioning, regulating and cultural categories are identified at the plan site that can be expected to be impacted, positively or negatively. The identification of the stakeholders is explained in section 4.2.2. An overview of the results of the review template showing the ecosystem services and their stakeholders can be found in table 1. In the text the stakeholders are referred to by their stakeholder title.

5.2.1. Residents of Djuplanda

Djuplunda is the only neighborhood that borders the plan area (see figure 6) and may be affected by the changes in three ecosystem services: aesthetic information and recreation. Furthermore, as users of the groundwater of Gotland for drinking water they are interviewed about the value of the water supply ecosystem in general. The residents of Djuplunda were represented in the SIA by various residents and it is from this pool that two people were interviewed Lisbeth Petterson and Els-Marie Elmqvist. Lisbeth Petterson has lived in Djuplunda for three years with her husband and son and works in Visby (Petterson, 2014). Els-Marie is retired and has lived in Djuplunda for many years, although not consecutively (Elmqvist, 2014). Both will be referred to as residents in the text.

5.2.2. Atheneskolan

Atheneskolan is the local primary school located in Djuplunda, which opened its doors in 2002. The school is a free school with alternative education that focuses on art as the basis of personal development. Their mission is to teach their students to be independent and creative (Atheneskolan, n.d.). The SIA showed that the Atheneskolan uses part of the area for excursions and for environmental education (see figure 6) (Forsemalm, 2011). This makes the school a stakeholder for the education ecosystem service. Furthermore, the SIA showed that the students of the school uses the area as their playground and is thus also a stakeholder for the recreation ecosystem service. As intensive users of the forest, the school qualifies as a stakeholder for the aesthetic information ecosystem service. Kristin Nilsson, the vice-principle of the school, was interviewed as the representative of the school. As well as two parents from the parents council: Karin Stephansson and Mats-Ola Jespersson, who will be referred to as interviewees of the parents council.

5.2.3. P18 IK

The local sports club P18 IK exercises three different sports: athletics, football and badminton. The first two sports are those that make the local sports club a stakeholder group for recreation and aesthetic information ecosystem services. The athletics branch of the sports club makes use of the running track that leads through the forest and the football fields lie in the plan area as well. Additionally, as frequent visitors of the forest area they are also stakeholders of the aesthetics ecosystem service. The club is also a primary stakeholder of the water supply ecosystem service as they use the groundwater of the well under the area for the irrigation of the area.

\(^3\) Groundwater protection zone are determined by the County Administrative Board (CAB) and the municipality. They are in place to make sure that the groundwater is protected against pollution which means that activity that may damage the water can be limited or forbidden (Region Gotland, 2013)
The chair of the football section, Johan Lindvall, the chair of the athletics section, Anders Österberg, as well as the general manager of the club, Börje Siggelin, were interviewed in a group interview.

5.2.4. CAB Animal & Nature
The department Animal & Nature of the County Administrative Board is a stakeholder for the refugium function and pollination ecosystem service as a representative for society. The CAB is involved with these services through their work with one of the 16 Swedish environmental objectives: “A rich diversity of plant and animal life” and under this goal falls the protection of the habitats (Swedish Environmental Protection Agency, 2011). The CAB works to achieve this goal and among others coordinates the initiatives to help achieve this goal. David Lundgren is interviewed as a representative for society from the CAB. He works primarily with the action program for endangered species and works for example with the motocross circuit area (Lundgren, 2014). He is referred to in text as the representative of the CAB Animal & Nature.

5.2.5. CAB Environment & Water
The Environment & Water department of the CAB is a stakeholder for the water supply ecosystem service as a representative for society. They are not involved with the technical details of the groundwater management. However they are involved with maintaining the good quality of the water also through the environmental objective “good-quality groundwater” (Swedish Environmental Protection Agency, 2009). Originally, the one in charge of the environmental objective was to be interviewed, however, due to illness the interview is held with Emilie Vejlens who works with the different environmental objectives. She is referred to in the text as the representative of the CAB Environment & Water.

5.2.6 Swedish Society for Nature Conservation
The Swedish Society for Nature Conservation (SSNC) is a stakeholder for the refugium function, pollination, education and aesthetic information ecosystem services. They are a stakeholder for the refugium function and pollination function as expert on the importance of the function for society. For the education and aesthetic information ecosystem services, the SSNC is a stakeholder as an organization that can use the area for their activities, excursion or educational activities. Jakob Wallin, a substitute in the board of the SSNC Gotland, is interviewed as a representative of the SSNC.

5.2.7 Gotland Ornithological Society
Gotland Ornithological Society is a stakeholder for the refugium function as well as the recreation ecosystem service. They classify as a stakeholder because of the Sand Martin that is present in the motocross circuit area according to the nature inventory (Andersson, 2013). For the first ecosystem service, the Gotland Ornithological Society is interviewed as a representative for society concerning the importance of the habitat of the Sand Martin. For the latter ecosystem service, the society is interviewed as a stakeholder for the recreational activity of bird watching. Bird watching is not brought up in the SIA, however since the Sand Martin is an appreciated bird (Hermansson, 2014), the presence of the Sand Martin potentially indicates the bird watching activity. Clas Hermansson, member of the board, is interviewed as a representative of the Gotland Ornithological Society.

<table>
<thead>
<tr>
<th>Ecosystem services and their stakeholders</th>
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</thead>
<tbody>
<tr>
<td><strong>Provisioning</strong></td>
</tr>
<tr>
<td>Water supply</td>
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<tr>
<td>Refugium function</td>
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<tr>
<td><strong>Regulating services</strong></td>
</tr>
<tr>
<td>Pollination</td>
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<tr>
<td><strong>Cultural services</strong></td>
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<tr>
<td>Education</td>
</tr>
<tr>
<td>Aesthetic information</td>
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<tr>
<td>Recreation</td>
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</table>

Table 1: Identified ecosystem service and their stakeholders.
6. Results

In this section the results of the interviews and the template analysis are presented. For each ecosystem service the baseline and the effects of the plan on the ecosystem service are presented. In each of these sections, first the ecosystem service’s productivity is discussed and after this the value of the ecosystem service is discussed. The productivity results are based on the desktop study and the interviews. The values of the ecosystem services are determined by categorizing the data from the interviews using template analysis.

6.1 Water supply

This ecosystem service refers to the retention of water in for example streams, lakes and aquifers that can be benefitted from by using the water as drinking water, irrigation or industry, for example (de Groot, et al., 2002). In this case, the plan area lies in a secondary water protection area (see figure 9) and there is groundwater reservoir that has been calculated to be 60 meters deep. Furthermore, there is a primary water protection zone that lies under the area of Djuplunda. The groundwater reservoir is sensitive to pollution due to Gotland’s fragmented bedrock which makes it easy for (contaminated) water to percolate into the reservoir (Sandström, 2012). Groundwater is of the utmost importance as most houses on Gotland use groundwater as drinking water. It is therefore important that the good quality of groundwater is maintained (Region Gotland, 2013; Vejlens, 2014). Besides using groundwater as drinking water, Gotland uses it for irrigation and animals depend on it as well (Vejlens, 2014). In this case, however, only P18 IK makes use of the water. They have a well of approximately 20 meters depth (Gustavsson, 2012) and they use the water to irrigate their football fields (Forsemalm, 2011; Siggelin, 2014). Their drinking water comes from the municipal water network. Previously, the club made use of the municipal water network instead of using the groundwater (Siggelin, 2014). The water supply ecosystem service has use (a.), option (b.), bequest (c.) and existence value (d.) (see table 2).

6.1.1 Baseline value

a. The use value is of a consumptive kind which is derived from the use of the ground water by P18 IK for the irrigation of their football fields. However, the club previously used the municipal water network for irrigation so, the use of the ecosystem service is replaceable. The general club manager explains that for the club is does not matter where the water comes from (Siggelin, 2014) and thus the use value of the groundwater for irrigation is relative to this.

b. When looking at the water supply holistically, this reveals the option value of this reservoir: the reservoir may in the future be used for drinking water, which gives option value to the reservoir. According to the climate predictions, there will be longer periods of droughts which would increase the groundwater demand and that consequently more wells may be drilled (Vejlens, 2014).

c. The bequest value is reflected in the environmental objective for good quality groundwater in the present as well as for the future generation (Vejlens, 2014). In the new water plan for Gotland, however, desalinization of seawater is proposed as a complement to groundwater as drinking water. Despite the salinization alternative it is important to maintain the water quality and thus the water supply ecosystem service to make sure that the next generations will be able to use the groundwater for irrigation or drinking water (ibid.).

d. Lastly, the existence value comes forward during the interviews with the resident of Djuplunda. Although neither have thought much about where their water comes from, neither of them likes the idea of it being replaced with or complemented by desalinized seawater (Elmqvist, 2014; Petterson, 2014). One of the resident even says: “maybe the tourist could drink that?” (Elmqvist, 2014). This reflects a certain level of existence value of groundwater as both appreciate that they drink groundwater. Since the well could in the future contribute to the municipal water network, this can, to a certain extent, be extrapolated to the groundwater in the area.

6.1.2 Effects of the plan

Due to the building of the subcomponents of the plan, there will be more hardened surfaces than there are now in the area. The precipitation will runoff these hardened surfaces such as roofs and parking lots, the rainwater may become contaminated before it percolates into the ground. This thus means there is a risk of groundwater pollution. Furthermore, with the increased traffic there is a chance of petroleum leakages from the cars, during accidents for example, which may contaminate the soil and consequently the groundwater (Sandström, 2012). However, there is a wide variety of contaminations of groundwater, some can easily be solved, some make it unfit for drinking water but then it may be still be possible to use it for irrigation purposes (Vejlens, 2014).
a. So in case of a contamination which would make the water unfit for irrigation purposes, then P18 IK would no longer be able to use the water, greatly impacting the use value of the water supply for them. This would subsequently affect society as the football club would then have to start using the municipal water network for irrigation purposes, increasing the demand on that network. This thus reveals that the society benefits from the water supply as well on greater scale. However, if it is a pollution that would only make it unfit for drinking, but it could still be used for irrigation the use value is not impacted.

b. The option value however, would be impacted in such a case, especially if the pollution cannot be cleaned up and the water could thus no longer be used for the drinking water purposes in the future. This would mean that the service would lose its option value. However, in the absence of a contamination no harm is done to the option value.

c. Likewise, the bequest value of the reservoir would be impacted if the pollution would make the well unfit for use by future generations.

d. The existence value only disappears in the case of a pollution that cannot be cleaned and makes the water unfit for drinking water.

<table>
<thead>
<tr>
<th>Values</th>
<th>Benefits</th>
<th>Impacts from plan</th>
<th>Change in value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Use value</td>
<td>Irrigation</td>
<td>Contamination</td>
<td>(-)/(n)</td>
</tr>
<tr>
<td>b. Option value</td>
<td>Potential drinking water</td>
<td>Contamination</td>
<td>(-)/(n)</td>
</tr>
<tr>
<td>c. Bequest value</td>
<td>Irrigation, Potential drinking water</td>
<td>Contamination</td>
<td>(-)/(n)</td>
</tr>
<tr>
<td>d. Existence value</td>
<td>Potential drinking water</td>
<td>Contamination</td>
<td>(-)/(n)</td>
</tr>
</tbody>
</table>

Table 2: An overview of the results for the water supply ecosystem service. Negative impact = (-), neutral = (n), positive impact = (+)

6.2 Refugium function

The provisioning of living space for both plants and animals is of the utmost importance for the conservation of biodiversity (de Groot, et al., 2002). An inventarisation of the species in the area have shown that there are 21 red listed species that live spread out over the area (Andersson, 2013). There are five fungi species of which two are close to extinction in the wild in Sweden, ten wild bee species of which two are close to extinction in the wild in Sweden and two vascular plant species, one bird species, the Sand Martin, and three different insect species that are all close to extinction (see figure 10). Most of the bees and insects as well as the Sand Martin can be found in the motocross area which has a very high nature value (see figure 8) and most bees can be found in more than one zone in the area. The pine forest hosts the two plants and the five fungi species. The analysis of the interviews showed that the refugium function has an indirect use (a.), option (b.) and existence value (c.) (see table 3).

6.2.1 Baseline value

a. The different species that are hosted in the area all in their own way contribute to the functioning of the ecosystems and this can be connected to the well-being of society (Lundgren, 2014; Wallin, 2014), giving the ecosystem service indirect use value. Two clear examples came up in the interviews of how society benefits from the habitats the area provides, the foremost being that of the bees. The motocross circuit is the habitat for...
several bee species (see figure 11), of which ten are red listed. These are wild bees who contribute to the pollination in and outside the area (Wallin, 2014). The representative of the CAB Animal & Nature goes on to explain that wild bees are known to be more effective than normal honey bees and they are therefore really important for pollination. The society for example benefits of this pollination because of the blooming flowers (Lundgren, 2014; Wallin, 2014). The indirect use value of the refugium function with regards to the bees also reaches outside of the plan area as the area are bee populations in surrounding environments that are connected to the bee population in the plan area (Wallin, 2014). The second example of a benefit of the refugium function ecosystem service is that it also makes sure that certain mushroom species can live in the area which could be picked by people in the area (Lundgren, 2014; Wallin, 2014). This benefit was confirmed by one of the residents telling about going mushroom picking in the area in the past (Elmqvist, 2014). The refugium function also indirectly delivers to the recreational ecosystem service, as the representative of the SSNC explains that he goes to the motocross circuit to look at the bugs that live there. So without the habitats for these insects he would no longer be able to do so (Wallin, 2014), a benefit from the recreational ecosystem system service would thus disappear. Neither of the residents see the benefit of the species in the area (Elmqvist, 2014; Petterson, 2014).

b. The option value of the refugium function is based mostly on not knowing what the exact function of each species is in an ecosystem. There is thus the uncertainty of not knowing what will happen if a certain species loses its habitat. The representative of the CAB Animal & Nature brings up the precautionary principle in relation to the fact that we do not know of all species what their function is. The representative of the SSNC adds to this that for example you can never know how much one specific bee species contributes to pollination. You should therefore think of the whole system and protect every species, just to be safe as well. The representative of the ornithological society gives the example of the Sand Martin: the Sand Martin has been on Gotland for a long time and you do not know what sort of contributions they make to the ecosystem.

c. Both residents express that to a certain extent they think it is important that the red listed species have a habitat and that they can live in the area, despite neither of them feeling like they directly benefit from the species. This thus indicates some level of existence value, however, neither of them felt very strongly about the species endangerment or them potentially being affected by the developments which shows the value is assigned is rather low.

6.2.2 Effects of the plan

The areas marked by red stars, in figure 8, are those where the largest impact is expected of the plan. The upper red star is where the camping will be situated. The old military barracks will be used as a housing at the camping site, but the surrounding forest will be exploited. In the forest, red listed species such as common slender eyebright and several fungi. The exploitation of the forest may lead to the disappearance of habitats for endangered species. The impacts may be diminished if as few trees as possible are cut down. The lower red star marks the area of the motocross circuit where red listed wild bees live in the sandy grounds. The bees’ habitat depends on the motocross activities as they prevent the track from overgrowing. It is important for the bees that an alternative activity will keep the area open and the impact on the bees’ habitats depend entirely on the effectiveness of the activity or measure that is taken to keep the area from overgrowing. Furthermore, it is important that the bees in the area to maintain the contact of the flora and bees in the area with the flora and bees in the surrounding areas (Sandström, 2012, pp. 35-37).

a. As explained in the text above, the species supported by this function have important (known or unknown) functions in the ecosystems that benefit society. This means that if these species are affected, so are the benefits that they create for society. From the examples given, this means the area may become less flower rich and there will be less mushrooms to pick. Furthermore, the indirect use value the bee population in the area has to the
surrounding bee populations may be impacted. If the population in the plan area is impacted then a fragmentation will come to exist between the bee population South and North West of the area.

b. With regard to the option value it is difficult to predict how it exactly will be affected since it is not known of all species what their specific function is. However, if the species are affected and their populations decrease, the unspecified option value these species hold in the status quo would be diminished.

c. Neither residents were aware of the existence of the red listed species, but they do appreciate the fact that the species are there. They hope that they will try to work around the habitats as much as possible to prevent the species from being impacted. However, both would prefer the developments of the plan over the species’ safety (Elmqvist, 2014; Pettersson, 2014). This indicates that the existence value of the species will not be impacted.

<table>
<thead>
<tr>
<th>Values</th>
<th>Benefits</th>
<th>Impacts of plan</th>
<th>Change in value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Indirect use value</td>
<td>Functioning ecosystem</td>
<td>Loss of bee habitat</td>
<td>(-)</td>
</tr>
<tr>
<td></td>
<td>Blooming flowers</td>
<td>Loss of flowers/plants/mushrooms habitat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mushroom picking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Option value</td>
<td>Unknown benefits</td>
<td>Species whose habitat is impacted become more vulnerable</td>
<td>(-)</td>
</tr>
<tr>
<td>c. Existence value</td>
<td>Enjoyment of knowledge</td>
<td>Species whose habitat is impacted become more vulnerable</td>
<td>(n)</td>
</tr>
</tbody>
</table>

Table 3: An overview of the results of the refugium function ecosystem service. Negative impact = (-), neutral = (n), positive impact = (+)

6.3 Pollination

This ecosystem service is essential for many plants’ reproduction and is provided by various species, of which one of them is bees (de Groot, et al., 2002). The pollination ecosystem service in the plan area is delivered by wild bees who are as explained more effective than normal honey bees. It is the bees that make sure the flora blooms within and outside the area (Lundgren, 2014). The pollination service has indirect use value (a.) as well as option value (b.).

6.3.1 Baseline value

a. Pollination is not just needed for agriculture, it is needed everywhere as it keeps the ecosystem going. Society’s well-being thus depends on this, but it is difficult to measure since you cannot know exactly how much bees pollinate (Wallin, 2014). However, it is known that wild bees are more effective pollinators than honey bees (Lundgren, 2014). Besides an unidentified dependence of society on the pollination, a clearer indirect use value of pollination is the enjoyment of blooming of the flowers (ibid.).

b. The option value of the pollination lies in the fact that we do not know yet exactly what happens if a certain bee species disappears, because we do not know the exact roll of every species. So for the future it is important to use the precautionary principle in projects and plans to make sure we do not unknowingly hurt the future (Lundgren, 2014).

6.3.2 Effects of the plan

The bees predominantly live in the motocross circuit area as there is lot of loose sand where the bees can live (Lundgren, 2014). The discontinuation of the motocross circuit would mean that the area may overgrow with vegetation which would destroy the habitat of the bees and lead to decreased pollination in the area. However, as this would fragment surrounding bee population, there may also be an effect on the pollination in surrounding areas (Wallin, 2014).

a. The loss of the pollination service in this area would lead to fewer flowers in the area, but as bees are a vital part of the ecosystem the ecosystem may suffer some unknown effects as well. However, it is difficult to say what the effect would be since you cannot know how much one bee contributes to the pollination (Wallin, 2014). The indirect use value would thus be negatively impacted by the implementation of the plan, however, in an unknown amount.
b. The option value of the pollination would diminish as well if the pollination service would be impacted by the plans through the loss of wild bees. This would mean that this unknown role that the species may have will be lost for the future as well.

<table>
<thead>
<tr>
<th>Values</th>
<th>Benefits</th>
<th>Impacts</th>
<th>Change in value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Indirect use</td>
<td>Functioning ecosystem</td>
<td>Destruction of bee habitat</td>
<td>(-)</td>
</tr>
<tr>
<td>value</td>
<td>Blooming flowers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Option value</td>
<td>Unknown benefits</td>
<td>Destruction of bee habitat</td>
<td>(-)</td>
</tr>
</tbody>
</table>

Table 4: An overview of the results of the pollination ecosystem service. Negative impact = (-), neutral = (n), positive impact = (+)

6.4 Education
Natural ecosystems provide (formal and informal) learning and study opportunities for environmental education (de Groot, et al., 2002). Besides contributing to environmental education, such excursions can also contribute to environmental awareness (Chiesura & Groot, 2003) and even benefit the experience of well-being (Millennium Ecosystem Assessment, 2003). The SEA and the nature inventory both show there are various rare species to found in the area and also a relatively large old pine forest (Andersson, 2013; Sandström, 2012). The area thus provides ample opportunity for educational purposes which can be enjoyed by children at Atheneskolan or other users. The primary area “Dungen” that was identified in the SIA to have such pedagogical functions is indicated by the pink area in figure 7. The vice-principle explains that there are different characteristics of the area that make the area very appropriate for educational purposes thus providing a strong educational ecosystem service to its main stakeholder. The features that make this particular area so appropriate is the fact that you do not have to cross a road to get to the nature area, you just simply open the gate of the schoolyard. Furthermore, the well maintained paths make it easy for teachers to take the children into the forest in an organized way. The wild nature can subsequently make sure that the children feel like they are really surrounded by nature and forget that there is a path nearby. The red listed species in the area did however not seem to add anything special to the area’s educational function, although the vice-principle could not say with certainty that the biology teachers did not use this in their lessons (Nilsson, 2014). The educational ecosystem service showed to have non-consumptive direct use value (a) and option value (b.) for its stakeholders (see table 5).

6.4.1 Baseline value
a. The use value lies in the activities that the school uses the forest for to enrich their curriculum with. The school uses the forest in different ways in their educational activities during school, as well as, during afterschool activities. Most of the time only the northern part of the area is used and the running tracks of one to three kilometer. Depending on the age group, the school involves the forest in different ways in their curriculum. In case of the younger children in elementary school, a popular project is the “square project” in which each class is appointed a square which the class follows through the seasons to see how the nature changes. The older classes learn about ecology during biology lessons and the area is then used if it concerns a topic where an activity in the forest can shed more light on the learning material. Examples of such topics are flowers, species or ecosystems. Twice a year, the whole school goes out together into the area and in groups they pass various activity stations; then also some of the more southern part of the area is used. The afterschool activities try to involve nature and thus the area into their work as well. They do this through taking the children into the area and to take things back from the forest and build different things with that. There is even an especially assigned corner for that in the school yard. Being able to use the forest in their school activities is one of the prime reason why the school board chose to move the school to this area, which reflects the importance of the area to the school (Nilsson, 2014). Both interviewees from the parent council make a point of it that it is important to include nature into the curriculum, although they have varying experiences about to what extent this is done at the school. They both believe that it is very important for children to learn how to behave in the forest and to learn about different species (Jespersson, 2014; Stephansson, 2014).
b. The area holds some option value for the school, because, as the vice-principle explains, she sees the increasing importance of education about nature and the significance on sustainable development. This means that in the future a sustainable development feature may be added to more subjects. This could potentially make the forest even more important as they learn how components of nature are interlinked with each other and society and use the area to demonstrate this interaction between nature and society (Nilsson, 2014). For the SSNC there is some option value in the way that they could use this area to teach about how nature can depend on human disturbances. The representative of the SSNC explains that most of their educational activities are focused on more untouched nature, but that it could be interesting to show how the bees and sand insects depend on the maintenance and use of the motocross circuit. There are however no concrete plans for such an activity and this does therefore give the motocross circuit area option value as an educational ecosystem service (Wallin, 2014).

6.4.2 Effects of the plan

The "Dungen" area will according to the SEA not decrease and the vice-principle does not think that the components presented in the plan will make the location less appropriate for education. However as she is afraid that the implementation of the plan opens the area for future developments there are some things she can think of that will make the area less attractive for the school. For example, she tells that if they would take away the trees that surround their school, she feels it would take away the accessibility to the forest. The vice-principle’s worry about the streetlights along the connection road and too many parking lots is a reflection of this same idea, if the forest loses its wild feeling, it will be less appropriate for the way the school likes to use the forest in their education (Nilsson, 2014). One of the interviewees of the parents council thinks that the parking lots from the plan may take away the wilderness feeling already (Jespersson, 2014). The vice-principle has another perspective and feels that it is mostly the traffic safety that makes the forest less appropriate for education.

a. The use value of the area may thus decrease due to the effects the plan may have as well as the effects of possible future developments resulting from the implementation of the plan. The area may lose its wild/safe character (Nilsson, 2014; Jespersson, 2014) and be less safe due to the increase in traffic (Stephansson, 2014). However, on the other hand, the vice-principle also thinks that because of the developments maybe more people with children will be moving to the area in the future. These children may then enroll at the school which means the school will expand. The school will thus use the forest more intensively, which would consequently increase its value to the school (Nilsson, 2014). With regards to the red listed species that may possibly be impacted, the vice-principle explains that she thinks that the biology teachers do not spend time on them nor use the forest to show them, however, she is not sure (Nilsson, 2014). One of the interviewees of the parents council expresses her feeling that it is important that children learn about red listed species and why we should protect them. So he thinks that if the red listed would be impacted that the forest would lose some of its educational use value (Jespersson, 2014).

b. The option value of the forest is based on the SSNC possibly using the area to show how human interaction with nature can also support some species. The motocross circuit would be the area they would use for this, however, if the motocross racing is discontinued this means that the essence of the area will change. If a new activity is set up to support the bees, insects and flowers, the activity would only be set up to support the habitat of the species. Whereas the motocross was not set up to create a living area for bees, but instead nature found its niche in this area. If the motocross area would instead be maintained by cutting and removal of plants, it would no longer present the same learning experience. This is because the motocross was not originally started to
provide suitable habitat, but instead was an incidental positive effect. Furthermore, if the forest does lose its characteristics that makes the area appropriate for the ways the school uses the forest now for its educational purposes, then the option value the area holds for the school will also diminish.

<table>
<thead>
<tr>
<th>Values</th>
<th>Benefits</th>
<th>Impacts of the plan</th>
<th>Change in value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. Use value</strong></td>
<td>Square project</td>
<td>Increased growth of Visborg</td>
<td>(+) (-)</td>
</tr>
<tr>
<td></td>
<td>Physical education</td>
<td>Loss of wilderness qualities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Children learn how to deal with nature</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Afterschool activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>b. Option value</strong></td>
<td>Learn about interaction between human and nature</td>
<td>Loss of habitat motocross circuit</td>
<td>(-)</td>
</tr>
<tr>
<td></td>
<td>More classes about nature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: An overview of the results of the education ecosystem service. Negative impact = (-), neutral = (n), positive impact = (+)

6.5 Aesthetic information

People enjoy aesthetic environments, which are, for example, reflected in the higher price of real estate close or with a view over a naturally aesthetic environment (de Groot, et al., 2002). The aesthetics of the area is described varyingly, but it is in general associated with the words “wild” and “scenic” or “idyllic” by the interviewees (Petterson, 2014; Siggelin, 2014; Österberg, 2014; Lindvall, 2014). The representative from the SSNC describes the forest to have mainland forest characteristics (Wallin, 2014), while the representative from the CAB Animal & Nature mentions the dominant pine forest (Lundgren, 2014). However, also the impact of the military is mentioned by almost all frequent users add here that you get used to these structures and that you do not notice them that much anymore (Nilsson, 2014; Siggelin, 2014; Jespersson, 2014). The responses from the interviews could be categorized into non-consumptive use value (a.), option value (b.), bequest value (c.) and altruist value (d.).

6.5.1 Baseline value

**a. The use value** is of a non-consumptive nature and came forward in several answers in the interviews. A strong example is the act of moving to the vicinity of the area because of its aesthetic characteristics. One of the residents moved from the city to Djuplunda because the area gave her the feeling like she was out in the country side, while Visby remained very accessible. So in the holidays, weekends or even in the evening after work, she can still get the feeling of being away from town and closer to nature (Petterson, 2014). The Atheneskolan also moved out of the city to this area because of its favorable characteristics. The previous location of the school had barely any nature or park, just a patch of grass to play soccer. When the school was growing too large and they could not expand in that location they decided to move to the P18 area because there were some buildings empty which made the forest area directly accessible. The vice-principle explains that what attracted them to area was the combination of the wild areas that “give you the feeling that no one has been here before” with the paths which make the children feel safe in the area and makes it easy for teachers to take the children to the forest.
developments in the area. However, as is pointed out in the interviews, the discontinuation of the motocross track will reduce the noise disturbance in the area, which has a positive effect on the use value (see table 6). It furthermore showed that for the non-expert stakeholders that the disturbance of the noise of the motocross is larger than the perceived benefit of the habitat it creates and the pollination it supports.

b. The option value is reflected by both residents, although the latter more from a retrospective perspective. One would like to be in the area more often in the future, although right now she does not think her habits will change (Petterson, 2014). The other explained that since she is retired she spends more time in the area taking walks, so for her the area held option value when she was still working (Elmqqvist, 2014). The representative of the CAB Animal & Nature explains that with the growing of Visby it will become increasingly important that there are pieces of nature such as this one which are easily accessible and people can use to be away from the city (Lundgren, 2014).

c. The bequest value of the area is linked to the growth of the city as well. The representative of the CAB Animal & Nature explains that the people now living on the other side of Visby may have no need for themselves to preserve this piece of nature. Their children or grandchildren, however, may move to this part of town in the future and want to enjoy nature close to their home as well (Lundgren, 2014).

d. The forest seems to have altruist value to a certain extent in the way that one of the residents would still want the area to be there even if she would not use it, because she thinks it is important for other people to have a place to go to so they can calm down and connect with nature (Petterson, 2014).

6.5.2 Effects of the plan

All stakeholders want the area to remain an area that is calm and in the interviews the road comes forward as the development that may change this (Elmqqvist, 2014; Stephansson, 2014; Petterson, 2014). The representative of the athletics section from P18 IK thinks that heavy traffic may be redirected from Tottavägen to this road and feels like that may change the feeling of the area (Österberg, 2014). The representative of the SSNC confirms this by sharing his thought on how the road may diminish the feeling of wild/rough nature in the area (Wallin, 2014). The vice-principle expressed that she feels that it would be ok with the road as long as it will not have any streetlights. Streetlight would for her make the road take up so much more space and really change the feeling of the forest around the road (Nilsson, 2014). Furthermore, some reasoned that because of the developments the plan brings, the area may start to grow. Both resident would like to see the area develop but do not want it lose its calmness (Petterson, 2014; Elmqqvist, 2014). One expresses that she hopes that the area will actually be developed to have health purposes and to not become a city area (Petterson, 2014). The school also uses the area to get the younger children outside to calm them down by being outside in the forest and the older children can sign up on a forest list to go take a walk to clear their heads from sitting inside so much. The running tracks surrounded by the quite wild forest lend themselves perfectly for this purpose (Nilsson, 2014). There are however some other opinions concerning the aesthetics of the area. One of the residents, for example, who has lived in the area longest of all the interviewees, sees the aesthetics of this area in a somewhat different light. She feels more that is a sort of non-area with no real purpose that is not exactly pretty or scenic: she would not invite her friends to come look at her forest. However, she still uses the area more often than the forest that lies east of the area and she goes for walks when it rains in the area because it has gravel and the forest covers her from the rain. She would not describe the area so much as nature, but more as a combination between a park and nature: there has already been too much human influence to be called nature (Elmqqvist, 2014). Specifically concerning the area of the motocross circuit, the representative from the Ornithological Society mentions that that particular area is very unattractive which makes the area unappealing for bird watching (Hermansson, 2014).

a. The use value may thus be impacted negatively by loss of wilderness feeling of the area due to the developments in the area. However, as is pointed out in the interviews, the discontinuation of the motocross track will reduce the noise disturbance in the area, which has a positive effect on the use value (see table 6). It furthermore showed that for the non-expert stakeholders that the disturbance of the noise of the motocross is larger than the perceived benefit of the habitat it creates and the pollination it supports.

b. The option value of the aesthetics lies in the fact that in the future, when Visby’s development has enveloped the area, the people that will then be living in the surrounding areas can enjoy it aesthetics. As shown, there is a certain worry that the aesthetic charm of the area will diminish and thus the option value accordingly. With regards to retirement, one of the residents does not think her habits will be affected by the outcomes of the plan and the option value that the area holds for her does thereby not decrease (Petterson, 2014).
c. Similar to the impact on the option value, the bequest value may diminish if the essential character of the area is lost due to the planned developments, in particular regarding the road. If the area no longer has the aesthetic feeling of sort of wild nature, while being organized, but instead turns into a park, the bequest value would decrease.

d. With regards to the altruist value, no value should be lost because, as long as people can still calm down by visiting the area, this value is not impacted. The calming characteristic of the area does not have to change even if the area turns into a park.

<table>
<thead>
<tr>
<th>Values</th>
<th>Benefits</th>
<th>Impacts of the plan</th>
<th>Changes in value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Use value</td>
<td>Move to the area</td>
<td>Noise</td>
<td>(-) (+)</td>
</tr>
<tr>
<td></td>
<td>Increased enjoyment of recreational activities</td>
<td>Loss of wilderness feeling</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enjoyment of nature</td>
<td>Discontinuation of motocross activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Improves recreational activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Option value</td>
<td>Accessible nature for Visby</td>
<td>Increased accessibility</td>
<td>(-) (+)</td>
</tr>
<tr>
<td></td>
<td>inhabitants</td>
<td>Increased development of Visborg</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Loss of wilderness</td>
<td>(-)</td>
</tr>
<tr>
<td>c. Bequest value</td>
<td>Nature close to/in Visby for the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>next generation</td>
<td></td>
<td>(-)</td>
</tr>
<tr>
<td>d. Altruist value</td>
<td>Important for people to be able</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>calm down</td>
<td></td>
<td>(n)</td>
</tr>
</tbody>
</table>

Table 6: An overview of the results of the aesthetics information ecosystem service. Negative impact = (-), neutral = (n), positive impact = (+)

6.6 Recreation

Ecosystems provide possibilities for recreational activities that bring refreshment, relaxation and rest. Sport activities, such as running and playing, as well as camping or picnicking recreational activities fall under this ecosystem service (de Groot, et al., 2002). People choosing to spend their time in natural environments shows that an area may have recreational ecosystem services (Gee & Burkhard, 2010). The area already has a strong recreational character which shows in the use of the area by the residents of Djuplunda, the sports club P18 IK and the motocross circuit. The interviews showed that in particular the running tracks are a very important feature in the area as they are used for running, walking and biking (see figure 14) and they give the area some structure which makes it accessible for many people. The open fields makes the area suitable for family outings or picnics, while the somewhat wild forest gives a feeling of nature when exercising for example. The ecosystem service has non-consumptive use value (a.) and option value (b.) to its stakeholders.

6.6.1 Baseline value

a. This ecosystem service has a strong non-consumptive value which shows in the different uses of the area by many different parts of society. One of the residents personally uses the area for walks in the evenings and weekends, but sometimes also have a family outing like a picnic. She mentions that almost every time that she is out for a walk she sees one of her neighbors who area walking as well, or running or biking. She also sees many people walking the dog in the area (Petterson, 2014). The other resident uses the area for walks but she mostly goes for walks in this area when it is a rainy day and she wants to go outside anyway. The gravel on the paths makes sure that it does not get too muddy and the tree cover protects her from most of the rain (Elmqvist, 2014). P18 IK uses the area for soccer as their fields are located in the area (Lindvall, 2014; Forsemalm, 2011) and the athletics department uses the area for their trainings (Österberg, 2014; Forsemalm, 2011). The soccer representative of P18 IK adds that some teams also use the running tracks for physical fitness trainings (Lindvall, 2014). The club house has a view over the soccer field and the open grass area that lies behind this and all of the P18 IK representatives have all observed that many young families use this area for picnicking when it is nice weather (Lindvall, 2014; Siggelin, 2014; Österberg, 2014). Furthermore, it comes forward during interviews that the area is used for orientation competitions (Jespersson, 2014; Siggelin, 2014). The school uses the area in various ways, among others for recreational activities. The school uses the forest with its running tracks and the obstacle course in physical education. The younger children go out and play in the area when it is nice weather and the teacher feels like it. Such young children do sometimes not even have to go far to find a place where they can be fascinated by a tree trunk for example and play for a long time. Furthermore, the afterschool activities organized by the school uses materials they get from the forest to build things for example. Lastly, the older
children are allowed to go out and play/walk/run in the forest in their break time (Nilsson, 2014). Despite that the Sand Martin has been sighted in the area of the motocross circuit, the area is not a known location for bird watching. The area where the Sand Martin breeds is furthermore not an attractive area to be for bird watching (Hermansson, 2014). However, the motocross circuit is used by Jakob and some of his friends who go to the area to study and observe the insects that live in the sand: the bees and the sand insects (Wallin, 2014).

b. The area has some option value when it concerns the growing city of Visby. The general manager of the P18 IK explains that the implementation of the plan can give P18 IK the possibility to grow in the future, while, at the moment they would not be able to take in many more members (Siggelin, 2014). The representative of Animal & Nature from CAB explains that with a growing city you need nature spaces for recreation which is why the area must preserve this characteristic (Lundgren, 2014).

6.6.2 Effects of the plan

The plan for the area is to improve the recreational and tourism possibilities and it is thus most likely that the recreational ecosystem will improve. Figure 7 gives an overview of all the subcomponents of the plan and shows that the recreational characteristics are boosted. For example, the running tracks will be lower down in the area, next to the sports hall, providing easier access. The camping that will be placed in the area will also provide the ecosystem service with a tourism dimension (Forsemalm, 2011).

a. Despite the general agreement that the area may become more urbanized, none of the stakeholders feel like they will be changing their recreational habits. This shows that there will not be a decrease in the use value of the area. One of the residents even thinks that for the people that work in the area, the sports hall would make it easier for them to use the running track because they can then shower there afterwards (Elmqvist, 2014). The general manager of P18 IK thinks that the camping may attract more teams to come and visit their club and that maybe it will attract more orientation competitions as well (Siggelin, 2014). However, if the there is no guaranteed traffic safety at the road then this may affect the recreational value of the running track. As the chairman of the athletics department explains, there have been several accidents at the road there is now, so if it becomes a busier road a viaduct is really needed to ensure safe crossing (Österberg, 2014). With regards to the discontinuation of the motocross circuit, this would not make it a better place for bird watching as the environment will still not be charming, even if the Sand Martin would still have bred in the area (Hermansson, 2014).

b. The option value may increase for the P18 IK as the development of the area may mean that they will even be able to grow more in the future. The city of Visby is growing which makes for potential growth of the club, but with the execution of the components of the plan, the area of Visborg may attract even more people to the area (Siggelin, 2014).
Reflection on results

There are some impacts on the benefits of ecosystem services that many stakeholders commented on and were brought forward repeatedly. The template analysis showed that the impact on the benefits may affect the values that the ecosystem service has for society. First, the education and aesthetics ecosystem service may be affected by the implementation of the plan as the wilderness feeling that is described by many stakeholders may be lost due to the components of the plan (Nilsson, 2014; Jespersson, 2014; Elmqvist, 2014; Anders, 2014; Petterson, 2014). The benefits of both of those ecosystem service hinge partially on the perceived touch of wilderness that the area currently has. The same impact thus diminishes the use value of two ecosystem services simultaneously. In the case of the aesthetic information, some loss can also be seen in the option and bequest value. This means that future uses of the area may be lost and that future generations may be impacted by the plan. This could be seen as particularly interesting because of the increased development of Visborg that the implementation of the plan may generate. In case of increased future growth, the maintenance of the aesthetic information becomes even more important since there will be more people depending on the nature in the plan area. The plan may thus have some contradictory effects. If Visborg develops much more resulting in further loss of nature areas, then the aesthetic information would become increasingly important in supplying the population with its benefits. However, due to the plan, the area may lose just those characteristics that now attract people to the area thus resulting in a loss of option and bequest value.

Two more ecosystem services that will be affected by the same impact are the pollination and refugium function services. The discontinuation of the motocross circuit will cause a great loss of habitat for both bees and flowers which then subsequently leads to a loss in pollination services. Non expert stakeholders such as the residents may not directly see the benefits of these two services (Petterson, 2014; Elmqvist, 2014). The expert stakeholders representing society do explain the value the services hold for society. Both see diminishing indirect use and option value which affects society on a greater scale. The loss in these value may result in greater costs for society as well since it may take greater effort to take care of the area now. Either through finding a new activity in the motocross area to maintain the services or to make up for the loss of services by extra care for the area.

Lastly, the water supply ecosystem may result in losses in various values, however, this remains largely speculative. Interestingly, Gotland’s new plan for the desalination of seawater changes the impact that contamination could have on the current society as well as on the future potential of the groundwater. However, the existence value of the groundwater is strengthened by the new water plan and protests reflect that the society maybe cares about where there water comes from. The new water plan thereby provides the groundwater with existence value.

<table>
<thead>
<tr>
<th>Values</th>
<th>Benefits</th>
<th>Impacts of the plan</th>
<th>Change in value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Use value</td>
<td>Walking/running/biking</td>
<td>Camping</td>
<td>(+)</td>
</tr>
<tr>
<td></td>
<td>Picnic</td>
<td>Discontinuation of motocross activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Playing</td>
<td>Increased traffic/travel safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Soccer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fitness training</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Motocross</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Camping</td>
<td>Increased development of Visborg</td>
<td>(+)</td>
</tr>
<tr>
<td>b. Option value</td>
<td>Recreation in nature in a growing city</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Potential to grow for P18 IK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7: An overview of the results of the recreation ecosystem service. Negative impact = (-), neutral = (n), positive impact = (+)
One impact, created by one or a collection of components of the plan, may thus affect various ecosystem services showing that the ecosystem services are linked by common ground. It is therefore important to keep a holistic view and to not only look at the subcomponents of the plan or review each ecosystem separately. When looking at the identification of the ecosystem services a certain division can be made between the types of ecosystem services. Both the provisioning and the regulating ecosystem services were identified through a problem raised in the original SEA, whereas the cultural ecosystem services were identified through the information given in the SIA. However, when looking at the characteristics that provide the area with the cultural ecosystem services, a clear link with the provision and regulating services shows (see figure 15). The cultural services are only successful as long as the provisioning and regulating services are functioning provide the characteristics the cultural services hinge on. The larger perspective thus shows that it is important that the environmental state of the motocross circuit is maintained to preserve it habitat functions. Interviews with the residents concerning the refugium function showed that the indirect use and existence value of this ecosystem service was quite low, while the recreation and aesthetics use value were quite high. Figure 15 shows that through the interconnections between those services, the refugium function should hold higher indirect use values to them. The CAB Animal & Nature and the SSNC, as experts representing society, did associate an appropriately higher indirect use value.

Besides being linked by their biophysical structures, ecosystem services are also embedded in society through their different stakeholders. Each ecosystem service, except for education, has at least three different stakeholders (see figure 16). Every stakeholder represent their own group in society or represents greater society, which shows how every ecosystem service has various functions for different stakeholders. These different functions the ecosystem service has is reflected by the values that the ecosystem service holds for its stakeholders. An example is the water supply ecosystem service which is currently only used by the sports club, but when taking a longer time perspective the water supply service shows to hold value for the future. Furthermore, its bequest and existence value show the importance of the quality of groundwater for next generation as well as the appreciation of being able to drink groundwater. The multitude of connections in figure 16 show that ecosystem services are deeply embedded in the welfare of society and figure 15 shows that the functioning of the ecosystem services in some case depend on each other.

The complex connections between the ecosystem services, its stakeholder and the biophysical structure requires taking precautions to prevent impact on the ecosystem services. The SEA already proposes mitigation measures for the groundwater safety and a different activity to keep the sandy grounds of the circuit from overgrowing. However, further measures should keep developments from turning the area into a park, for example, do not put picnic tables everywhere and do not put streetlights along the road in order to keep the wild/nature feeling of area.
If proper precautions are taken the impact on the ecosystem services and their stakeholders can be kept to minimum and the only large impact will be from the road which may take away the wilderness feeling on which the cultural ecosystem service hinge. The camping is not expected to have as large of an effect as the road, since the camping is aimed to be a health and sports camping and will use some of the former military buildings and will thus leave the pine forest largely intact. The other impacts of the subcomponents of the plan can be mitigated by implementing sufficient measures (Sandström, 2012).

Fig. 16: Diagram showing the result of the interviews of how the ecosystem services are embedded in society as experienced by stakeholders.
7. Discussion & Conclusion

The aim of this research thesis is to explore the use of qualitative methods to evaluate the impact on ecosystem services in a strategic environmental assessment. Through using the qualitative method of interviewing, the assessment on the impact on ecosystem services aims to reveal how the direct drivers of change, the sub-components of the plan, affect the socio-ecological systems (Busch, et al., 2012). An example of that in this assessment is shown in figure 15 in which the results of the thematic analysis shows the connections between the ecosystem services, the biophysical structure and the benefits for the stakeholders. The interviews and template analysis thus revealed how one drivers of change may impact the socio-ecological system and thereby confirms the findings of Bush, et al (2012). Figure 15 as well as figure 16 show that the choice of qualitative data indeed provides the evaluation with a holistic overview (Tuvedal & Elmqvist, 2011; Busch, et al., 2012; Hausman, 2012) that shows how ecosystem services are embedded in society and where it draws its values from.

Combining the use of qualitative methods with the economic concept TEV gave structure to the results of the semi-structured interviews as it is used as the categorization in template analysis (Edwards & Abivardi, 1998). The results from the semi-structured interviews are long (see appendix 2) and without the proper categorization no structure could have been found in the data. TEV furthermore made sure that not just the use values are focused on but that some perspectives are also taken, showing that TEV ensures that tradable and non-tradable benefits are considered (Edwards & Abivardi, 1998). Often the questions relating to the use value were answered extensively resulting in the sections on the use values being longer and more detailed than those on the other values. Often the participants had most problem with questions relating the non-use values, the existence value, altruist value and bequest value. The participant had often not given it much thought or was unsure how to relate to it; consequently resulting in shorter section with fewer details. Although the semi-structured interviews provided the participants the chance to think about their answer and ask questions, the non-use values are difficult to grasp. This corresponds with the results of economic valuations in which the non-use values are hard to accurately price for participants (Kumar, et al, 2013). However, not just the non-use values were difficult to describe in some cases. For example, the indirect use value of the pollination and habitat were difficult to relate to for the residents, despite them enjoying some of the benefits of the ecosystem services. This corresponds to the findings of economic valuation where the main problem is inaccuracy of the pricing because the participants of economic valuation studies find it hard to relate some benefits and have little knowledge about them (Busch, et al., 2012; O'Neill, 1997; Kumar & Kumar, 2008, Hausman, 2012). However, because it was a qualitative evaluation the stakeholders could bring much more nuance to their answer. An example of a nuance is when one of the residents of Djuplunda explained that she really enjoys taking walk in the forest, however, she would not invite her friends to come and take a walk with her in the forest (Elmqvist, 2014). The nuance lies in the fact that she does really want to be in the forest, but she does not think that it is an exceptional forest in its beauty.

The values of some ecosystem services were thus difficult to relate to for the non-expert stakeholders. As Daily (1997) explains, ecosystem services can have different functions and do not just provide people with goods. For example, the pollination service is a regulating service, while the school benefits from the educational ecosystem service that fall in the category of cultural services. The biophysical components of most of the ecosystem services present in the area are already discussed in the SEA and others are brought up in the SIA. However, the next step in which the other perspective is taken to see how nature benefits people and how this may be affected in not taken in this SEA, as in many SEAs (Honrado, et al., 2013; Wärmbäck, 2013). The goal of the Swedish government is to change this by making it obligatory to discuss ecosystem services in EIA and SEA from 2018 (SOU 2013:68, 2013, p. 17). The method used in this thesis aims to make the impact on the ecosystem services and their stakeholders more visible. The method does make the nature-society connection more visible and prominent. Using semi-structured interviews meant that the results were quite extensive making it hard to decide what information to leave out. On the one hand, this makes the result section rather extensive and possibly harder to oversee for decision makers. The results are, on the other hand, comprehensive which could lead to more informed decision making. This is consequently supposed to result in better economic decision making, safeguarding of livelihoods (Commission for Environmental Assessment, 2006, pp. 50-53) and the avoidance of negative impacts on human well-being (DAC Environet, 2008). With regards to safeguarding livelihoods, the results show that the school integrates the forest into their educational program and if the education ecosystem service would be impacted, this would affect the school’s business. The method revealed the extent of the school’s dependency on the area and how the implementation of the plan could affect the school. Discussing ecosystem services in SEA would thus be able to shed more light on what the effects of a plan can be for society by looking at how the people benefit from nature.

However, it is not just about making better economic decisions, and safeguarding livelihoods, it is also about conserving ecosystem services. Having ratified the CBD (CBD, n.d. c), Sweden agreed to halt the loss of biodiversity and destruction of ecosystem services (CBD, n.d. b). The integration of ecosystem services in SEA is one of the tools to achieve this. The method used in this thesis does make the impact on ecosystem services more visible which could help in the planning phase to avoid as much impact as possible. This thesis shows that
there are more methods that can still be developed and that the choice does not have to be between existing methods. Research into quantitative, qualitative and monetary assessment techniques may show a new combination that will capture the advantages of each. It is therefore recommended that further research is done by the state into interdisciplinary and qualitative methods for valuing ecosystem services in SEA. By working with different disciplines, a valuation method may be developed that is all encompassing and easy to understand for decision makers.

7.1 Reflections

Since there is hardly no SEAs that have already integrated ecosystem services, this thesis was an exploratory case study using qualitative methods to value ecosystem services. The study was retrospective which may have simplified the process of identifying ecosystem services and the stakeholders. The choice of non-expert stakeholders may thereby have been influenced to a certain extent, since those that participated in the SIA process were also chosen as stakeholders. This may have prevented the identification of non-expert stakeholders that were not in the SIA, but still of relevance to the ecosystem services. The methods used in this thesis would thus have to be integrated into the SEA process to see if this methodology works properly and gives results in a real situation. Furthermore, there were some parts of the thesis that are important to reflect on since the choices made may have influenced the results.

First, the main focus of methodology in this thesis lies on the impact on the stakeholder and the impact on the productivity of the ecosystem services is thus not quantified. It is largely based on the information provided in the SEA and thus no specific ecological research is done into this. If the methodology would be integrated, the impact assessment could have some more focus on the impact on the productivity of the ecosystems service.

Second, an expert stakeholder that was should have been interviewed regarding the water supply ecosystem service is the municipality of Gotland. However as they did not agree to an interview, they were left out of the stakeholder group. The view of the municipality could have clarified the potential future of the water reserve and elaborated on the measures that will be taken to prevent water contamination.

Lastly, the use of template analysis may have biased the type of information provided by the stakeholders since the interview guides were based on what kind of values an ecosystem services could have. Using thematic analysis, like in the study by Tuvendal & Elmqvist (2011) could have eliminated this problem and provided more flexibility, however; then the structure and clarity of the TEV categories may have been lost.
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Appendix 1.1 Interview Guide: Residents of Djuplunda

Ecosystem services

- Aesthetics
- Recreation
- Water supply

General Questions 1

1. Är du aktiv i naturen i generellt?

Questions for I. a + b

1. Hur skulle du beskriva området?
   - Tänk på egenskaper som lugn, natur, vacker, park eller skog.
2. Hur skulle du säga att området används av boende i Djuplunda?
3. Hur använder du området?
4. Är du i området i dagliga livet?
   - I vilken del?
5. Vid vilken tillfällen är du i området?
6. Hur ofta skulle du säga att du i snitt är i området under en månad?
   - Skulle du vilja vara där oftare i framtiden?
7. Om du inte skulle vara/är i området ofta, skulle du fortfarande vilja att den finns där som den ser ut idag?
8. Varför ska du till området?
9. Vad är din upplevelse av området?
10. Vilka egenskaper har området som du uppskattar eller inte uppskattar?
11. Vet du om att det finns boende i Djuplanda som bor här för att vara närmare till ett skogsområde?
    - Har plan området en av de egenskaperna?
13. Visst du att det finns olika rödlistade arter i området som idag är ovanliga och behöver extra skydd?
    - Du och samhälle njuter kanske inte av de direkt, så är det då viktigt att arterna finns?
    - Varför, hur då?

General Questions 2

1. Känner du till detaljplanen?
2. Är du positiv till planen?

Questions for II.

1. Vilka typer av ändringar skulle göra området mindre intressant för dig?
2. Om en ny tvärförbindelse byggs, skulle det ha någon effekt på din upplevelse av området?
   - Skulle det vara lika attraktiv att vara i området?
3. Det finns många olika arter i området som kommer att bli påverkade av verksamheter, ändrar det något för dig om hur du känner inför området och planen?
   - Blir det mindre intressant?
4. Vad tycker du om att en camping byggs i den äldre delen av skogen?
5. Tror du att dina vanor kommer att ändrar med tanke på allting som vi har pratat om?

Questions about the water supply

1. Vet du vem som försörjer ditt vatten?
2. Visst du att det är grundvatten?
3. Vad tycker du om det att allt era dricksvatten kommer från grundvatten?
4. Tycker du att Region Gotland ska vara försiktigt med kvaliteten av grundvatten för framtiden?
   - Varför?
   - Är kvaliteten av grundvattnet en anledning för att inte bygga någonting? Hur hög får kostnader blir för vattnet för att behålla kvaliteten?
Appendix 1.2 Interview Guide: Atheneskolan

Appendix 1.2.1 Kristin Nilsson, Vice-principle Atheneskolan

Ecosystem services

- Education
- Recreation
- Aesthetics

General Questions 1

1. Känner du till området?
2. Är du aktiv i naturen?

Questions for I. a + b

1. Hur skulle du beskriva området?  
   a. Tänk på egenskaper som lugn, natur, vacker, park eller skog.
2. Hur använder skolan området i den dagliga verksamheten?  
   a. Vad har ni för aktiviteter i området?
3. Varför använder skolan området?
4. Hur ofta är elever i området? Också efter skol?
5. Hur använder ni området/skogen för utbildningen och hur upplever ni det?  
   a. Vad är det som ni hoppas att elever lär sig av skogen?
6. Är utflykter en viktig del i skolans utbildningsfilosofi?
7. Tror ni att naturen kommer att bli lika viktigt i framtiden för skolan?
8. Vilka egenskaper gör området till ett område som ni använder för utbildning?
9. Vilka negativa egenskaper finns i området?
10. Hur skulle du beskriva bullermiljön för området?
11. Hypotetiskt, om ni inte skulle ha tillgång till området finns det något område som skulle kunna ersätta det nuvarande?

General Questions 2

1. Känner du till detaljplanen?
2. Är du positiv till planen?

Questions for II.

1. Vilka typer av ändringar skulle göra skogen mindre intressant för utbildningsändamål?
2. Om området som ni använder för utflykter skulle bli mindre, vad skulle det betyder för er?
3. Om området inte skulle ha så många olika arter, skulle det ha en effekt på utbildningen?
4. Om en ny tvärförbindelse byggs, skulle det påverka era upplevelser av skogen?

Appendix 1.2.2 Parents council Atheneskolan

Ecosystem services

- Education
- Recreation
- Aesthetics

General Questions 1

1. Känner du till området?
2. Är du aktiv i området?

Questions for I. a + b
1. Hur skulle du beskriva området?
   a. Tänk på egenskaper som lugn, natur, vacker, park eller skog.
2. Kan du beskriva hur skolan använder området i sin utbildning?
3. Uppskattar du att skolan har utflykter till skogen? Uppskattar du
4. Vad vill du att dina barn lär sig om naturen?
5. Vad vill du att dina barn lär sig om olika växter, svampar och djur?
6. Tycker du att skogsområdet är en lämplig plats för utbildning om naturen och varför?
7. Vad har ditt barn lärt sig av att vara i skogen?
8. Är det viktig för barn att lära om och att vara i naturen?
9. Vistas du i området med dina barn?
   a. Varför?
10. Finns det ett bättre alternativ för framtiden för barn att lära sig om naturen?

**General Questions 2**

1. Känner du till detaljplanen?
2. Är du positiv till planen?

**Questions for II.**

1. Vilka typer av ändringar skulle göra skogen mindre intressant för utbildningsändamål?
2. Hur tror du att den nya sporthallen, tvärförbindelsen, parkeringsplatsen och elljus kommer att ändra upplevelse av området för barn?
3. Vad känner du inför ett scenario att några hotade arter försvinner delvis eller helt från området?

**Appendix 1.3 Interview Guide: P18 IK**

**Ecosystem services**
- Recreation
- Aesthetic Information
- Water supply

**General Questions 1**

1. Känner ni till plan området?
2. Är ni aktiv i naturen i generellt?

**Questions for I. a + b**

1. Hur skulle ni beskriva hela P18 området?
   a. Tänk på egenskaper som lugn, natur, vacker, park eller skog.
2. Förutom fotbollsplaner, hur använder ni området?
3. Använder fotbollsföreningen motionsspåret?
4. Ni har ett sprinklersystem för fotbollssplaner som använder grundvatten som finns i området?
   a. Kommor ni att använda detta när ni har konstgräs?
5. Tycker ni att området är lämpligt för klubbens verksamheter?
   a. Vad är egenskaper som gör det lämpligt?
6. Vad görs det att det är tvekligt att vara i området? Är det naturen eller infrastrukturen eller något annat?
7. Hur upplever ni eller er medlemmar att springa på motionsspåret och spela på planer?
8. Hur skulle ni beskriva naturen i området?
9. Hur skulle ni beskriva bullernivå?
10. Hur se du på framtiden för klubben i området?

**General Questions 2**

1. Känner ni till detaljplanen?
2. Är ni positiva till planen?

**Questions for II.**
1. Vilka typer av ändringar skulle göra området mindre intressant för idrottsändamål?
2. Vad skulle den nya tvärförbindelsen har för effekt på era verksamheter?
3. Hur kommer elljus att ändra upplevelsen av motionsspåret?
4. Hur kommer upplevelsen av naturen i området bli påverkat med elljus vid planer och spåret?
5. Vad tycker ni om att en camping byggs i den äldre delen an skogen?
   a. Kommer den att ändra hur ni upplever området? Refer back to the things they named in earlier question of why they like being here
   b. Påverkar den er möjlighet att utnyttja området?
6. Om grundvattnet skulle bli förorenad, vad skulle det betyda för klubben?

Appendix 1.4 Interview Guide: CAB Animal & Nature

Ecosystem services
- Refugium function
- Pollination

General questions I
1. Känner du till området? Och har du besökt den?
2. Hur arbetar du i din tjänst med natur?

Questions I. a+b
1. Hur skulle du beskriva området?
2. Tänk på ekologiska värden till exempel.
3. Känner du till de olika arterna som finns och trivs i området?
4. Varför är det viktigt att försöka att behålla hotade arterna eller att förhindra att arterna bli hotade?
5. Vad betyder det för Visbys boende och Gotlands samhälle att det finns områden som det här som är hemma till arterna?
6. Vad betyder det för de människor som inte aktivt använder området?
7. Är det lika viktigt att behålla mindre hotade arter som hotade arter?
8. Vad skulle det betyder för området om mindre bin skulle finnas i området?
9. Varför är pollinering en sådan viktigt ekosystemtjänst? (nu och i framtiden)
10. Hur jobbar Länsstyrelsen med området som Visborg som inte är skyddad natur?

General Questions 2
1. Känner du till detaljplanen?
2. Är du positiv till den?

Questions II
1. Vad har det för effekt (direkt eller indirekt) på samhälle om färre växtarter eller bin skulle leva i området?
2. Vad skulle det betyder det för framtiden om mindre pollinering skulle ske i området?
3. Hypotetiskt, om området som den ser ut idag inte skulle finnas, finns det något område i närheten som skulle kunna ersätta det nuvarande?

Appendix 1.5 Interview Guide: CAB Environment & Water

Ecosystem services
- Water supply (use, option, bequest, existence)

General questions I
1. Hur jobba ni med grundvatten på Länsstyrelsen?
2. Hur väl känner du till området?
3. Hur arbetar du i din tjänst med natur?

Questions I. a+b
1. Hur viktigt är rent grundvatten för Gotland?
2. Varför är det viktig att behålla grundvatten av god kvalitet?
3. Är det bara viktigt för den nuvarande generationen?
4. Hur speglar det i er verksamhet?
5. Vilken roll spelar mindre grundvattensbrunnar i Länsstyrelsens verksamheter till att nå miljömålet?
6. Spelar det någon roll om grundvattensförbrukingen ökar?
7. Har grundvatten någon speciell anseende för Gotland, förutom att nästa alla dricksvatten är grundvatten?

General Questions 2
1. Känner du till detaljplanen?
2. Är du positiv till planen?

Question II.
1. Hur jobbar Länsstyrelsen med föroreningar av mindre brunnar?
2. Om en mindre brunn som används bara för ett sprinklersystem skulle bli förorenad, skulle det ha någon effekt på samhälle eller bara för den som använder vattnet?
3. Hur skulle samhälle reagera om mindre del dricksvatten skulle vara grundvatten?

Appendix 1.6 Interview Guide: SSNC

Ecosystem services
- Refugium function (use, altruist, existence, bequest, option)
- Pollination (indirekt use)
- Education (use, option, bequest)
- Aesthetics (use, existence)

General questions 1
1. Känner du till området?
2. Har Naturskyddsföreningen något att göra med/i området?

Questions I. a+b
1. Hur skulle du beskriva området?
2. Skulle du säga att det finns riktig natur i området?
3. Hur skulle du säga att samhälle njuter av att det finns ett sådant tillgängligt område?
4. Är det viktigt att back首都läger häckar i området?
5. Det finns några hotade växter i området, gör det området intressant för naturskyddsföreningen mission?
6. För vilka åldersgrupper är det i speciellt viktigt att detta naturområde finns?
7. Skulle ni kunna använder området för aktiviteter av naturskyddsföreningen?
8. För utbildning?
9. Varför jobbar naturskyddsföreningen för att behålla naturen? Vad är er mission? (framtiden?)
10. Är området som vi pratar om idag ett område som ni tror är viktigt att behålla?

General Questions 2
1. Känner du till detaljplanen?
2. Är du positiv till planen?
Questions II

1. Hur kommer den nya tvärförbindelsen, parkeringsplatsen och elljus att påverka upplevelse av området?
2. Vad skulle det, enligt naturskyddsföreningen, betyda för samhälle eller åtminstone för de som bor i närheten av området om färre antal arter skulle finnas i planområdet?
3. Hur skulle det påverka samhälle om färre bin, fåglar, biodiversitet skulle lever i området?
4. Hur skulle ni agera om backsvalas häckning skulle bli påverkat och färre bin, fåglar, svampar och växter av verksamheter som tillåts av planen?

Appendix 1.7 Interview Guide: Gotland Ornithological Society

Ecosystem services
- Recreation

Questions I. a+b

1. Ni visste inte att det finns häckningsplatser för backsvalor i området, men nu att ni känner till det, kommer ni att fågelskåda i området?
2. Skulle det kunna bli ett område som blir intressant för er medlemmar i föreningen?
3. Häckningen skär vid en motocrossbana, är det något som gör området mindre skicklig för er?
4. Tycker ni att det är viktigt i generellt att det finns platser där backsvalor kan häcka på Gotland?
5. Varför?
6. Är backsvalan en uppskattad fågel för en ornitolog?

Question II.

1. Om motocrossåkningen förminskar i området, skulle det göra platsen mer lockande för fågelskådning för föreningens medlemmar?
Appendix 2.1 Interview Summary: Residents of Djuplunda

Appendix 2.1.1 Els-Marie Elmqvist

Interviewee: Els-Marie Elmqvist
Date: 2014-04-28

Part 1

Els-Marie has lived in the area for many years and has seen the area change from a military area to a more or less abandoned area and has seen the traffic increase. She often spends time in nature as she is now retired and has more time, so she uses the area often for walks.

When asked to give a description of the area she starts with the history of it to give a full perspective. She explains that, in the 1948, the area was only military which meant that the area was closed off and when her children went into the area they often found gun cartridges. In the 80s, the area was all of a sudden opened up and its military function was discontinued and she then used the area for picking mushrooms and before the area was surrounded by traffic she also picked berries. The area is fragmented by many gravel roads, some only small paths and some larger roads. She would not really describe the area as a real nature area and neither would she describe it as beautiful, because it has been too disturbed by 100 years of military activity. Then she would go to another area called Högliden, which lies much more west of the area we are discussing. The forest to the east she would see a little more as nature as it is a little more varied and does not only have pine forest. The plan area she would describe as an area that is somewhere between a park and nature, she would, for example, not invite people to come and see the forest. Through the years she has used the area for picking berries and mushrooms, walking, running and biking and in the past her children used the area to play in.

Els-Marie is in the area about once a week, although she wishes she could say that she is there more often. When asked if she would mind if this area would disappear as it is now she explained that she is not that charmed by the area as it is now. She ponders that it would actually be good if there would be a little more people around in the area and that it becomes more part of Visby. She explains that as it is now, her neighborhood Djuplunda feels a little closed off from Visby. Therefore she would not mind if there would be more buildings and activity in the area. She then explains how it came to happen that Djuplunda became sort of closed in. While the area was still a military area, the area felt more as a non-area and the neighborhood was in a way closed in by the military area on the west side and the large road on the east side. So the only way to get out was to go north. When the military was still active the military police would even kick them out when they would go there to pick mushrooms for example. Still now that they can access the area it feels as an area with no real purpose and so she thinks it would be good if there would be a little more life in that area. However, she does add that it should not become too tightly built either.

In reaction to the question how she feels that there are several red listed species she admits that of course it is important those species have a place to live, but that those species maybe only grow there because of the military activities. She wonders how much these species are protected by the law. So I explain that in this case they are allowed to build if measures are taken to protect the species as much as possible so that the impacts are kept to a minimum. She then concludes that of course it is important that the species are there, but that when looking at reality that development such as these are important as well: “we cannot all crowd together inside the city walls”. So it is important to protect but sometime sacrifices need to be made because the city is and has to be growing and developing.

Part 2

She knows of the detailed development plan, but would not say she knows all details very well. She is positive towards the plan because as she explained Djuplunda feels closed off in a way. However, maybe it is not so fun with the large sports hall and the parking lots. She then explains that the there is one thing that is problematic for the development Visby. The town plan can be described as the half of a sun, the sun being the inner-city and then the city only grows along the roads leading out of the city, which can be seen as sunrays. She would like to see that they build more in-between these sunrays. So in that way this plan is good because is focusses on some development between the sunrays.

She explains that the amount of traffic has increased quite a lot over the years and with the sport hall this will surely increase more and this is not very attractive, however, mostly for those people with children. The connection road will make it easier for people to get around. However, for her personally she does not
believe that the new road will be any good. She also says that the little that was still charming in the area could maybe disappear because of the road, the parking lots and sports hall. Right now she especially likes going for a walk in the area when it is rainy because there is gravel on the roads and paths so you do not get too muddy and the forest protects you from the rain. She does not think that when everything is done that any of her habits in the area will change. However, walking in the area will then feel a little more like a city or a park, while it is now more half city and half wild nature.

When we then return to the topic of the red listed species possible being affected by the development she remains with her earlier standpoint. Those species are very important, but that she has a hard time saying that it we should always protect the red listed species because she believes that there are many children that will benefit of the sports hall for example.

We then touch upon some specifics of the development plan. When it comes to the camping she would not like it if there would be more tourists. This would also lead to even more traffic. When it comes to the increase in traffic she finds the noise most disturbing because it takes away the calmness. However, she does not think she would stop walking if there is a little more traffic noise, because you can already hear the traffic now. She adds that she thinks that the traffic security should be looked at carefully and that maybe with more traffic they will actually make some bike roads, which would benefit the residents. With regards to the sports hall she thinks that it will make the use of the area more comfortable, because people that come from further away or work can shower there.

Part 3

In the last part of the interview we change to the topic of water. She wonders what kind of alternatives there are on Gotland when it comes to their drinking water. I explain that they are planning to use desalinization of seawater as a possible alternative in the times that there is a higher need for drinking water, such as during the summer. Her first response to this is if there is any discussion about how much energy it takes to do so. She would prefer groundwater over the seawater alternative and jokes that maybe the tourist can drink the seawater so that the population can continue to use the groundwater. She recognizes that in warm summer periods you are not allowed to wash the car to make sure that the groundwater level does not go down too much so she can imagine that they might look at an alternative. She is, however, not very positive towards the desalinization, but mostly because of the fact how much energy it would cost.

If the groundwater in the plan area would become contaminated from the building she does not believe that the execution of the plan would be any good. She mentions that people often do not think about where there water comes from and how they may or may not pollute it. So in that case maybe it should be built somewhere else to protect the groundwater.

Appendix 2.1.2 Lisbeth Petterson

Interviewee: Lisbeth Petterson
Date: 2014-04-28

Part 1

Lisbeth Petterson has lived in Djuplunda for 3 years. She used to be a member of the Naturskyddsföreningen, she would not say she is particularly active in the forest but she does enjoy being in the forest and around the area, so she goes for walks there.

In reaction to the question to describe the area she starts by explaining that many people on Gotland have two houses, one in the city walls and one in the land. This house is a good combination of the two because she feels like she is still out of the city when she is home on a holiday, but at the same time the city is easily accessible. She would maybe not describe the area as beautiful per se, but maybe idyllic is a better word to describe what she thinks of the area. She also says that she is getting more and more charmed by the area. They moved to this area to be close to Visby and because of the schools location, but then they did not know much about the surrounding area. Now they really like the area and their neighbours.

She is often out in the running track, but for walking. She explains that many people that live in Djuplunda use the area for walks or biking, she usually runs in to one or more of her closer neighbours when she is out there on a weekend. Also, her son goes to Atheneskolan which means that she is also in the area because of that and her sons friend lives on the south side of the area. The family is in the area for playing or just when biking through the area when going somewhere else. She is mostly in the northern part of the running track. When she takes a
walk this is usually in the evening or in the weekend. She is there about two times a week but would like to be there more often in the future. Even if she would not use the area as much she would still like it to be there because she thinks it is a great area which really gives everyone the possibility to calm down from daily activities such as work. If there was a plan to reorganize the whole area so that it would completely change she would definitely protest.

She very much appreciates that there is light along the track and that the sport hall will be lit up, because the area is still a little rough is some places from the military. When going alone, she prefers going to the areas where the paths are a little better taken care of and where the area is somewhat more organized. When it is more of a family outing is the middle of the day then she will go to any area, but when it is evening she prefers to be in the more northern area. She still wants it to be somewhat quiet and calm but she wants to feel safe as well.

When it comes to how she feels about red listed species being the area she thinks it is important that not everything is exploited because it is not good if all threatened species are just taken away, although she does not really have any direct use for the red listed species in the area.

Part 2

She is positive to the plan, but she mentions a couple of concerns that the neighbourhood has which she shares. One of these things is that is important that the area is for health purposes; there was a strong feeling that with the future developments no stores like System Bolaget should be built. Also, with regards to the camping it is important that the camping is taken care of. She remembers that there were a couple of campers in the area some time ago and in that then there were a lot of break-ins in the neighbourhood. If the camping will become as planned, which is a sports and health focused camping then she would not mind that there is a camping. So it should not become a youth camping for youth under 25, but it should be what it is planned to become, then it would be ok. If she would see the camping from the running track this would matter as long as it is people that are there for sports reasons. She would not want to find beer cans in the area. She does not think that the area is just for the people living here, it would be great if more people would use the area, but she does not it want to become a BBQ area where they sit around a fire with alcohol. So she wants it to continue to be calm in area as it is now. Another concern is that the increased traffic because of the sports hall should be taken care of properly. She mentions that now there is a very unsafe traffic crossing where up till now nothing happened and that besides more traffic there will also be more children that cycle.

When it comes to traffic noise she mentions that there are even street races in the area sometimes and that the police says they pick up the most speeders in this area. However, she does not feel that there is much control on this. She knows that there will maybe be more noise in the area, but this is alright with her, it is more the traffic security she worries about. With regards to the experience of the forest being a calm place to be, she says she can hardly imagine that there will always be so much more traffic and noise that it will really have an effect on that experience. Maybe with events there will be a lot more traffic, but considering it is a sports hall and there will not be large parties 5 times a week, it should not be a problem. Maybe if it was the case that there would be so many parties every week she would maybe say something different, but as it looks now it should be ok with the purpose they have for halls. The city has to grow and she sees it as positive that the city is growing. In conclusion, she does not think that the execution of the plan will change her experience of the area. She would even like to see some more developments like some housing and maybe even some grocery stores. As long as the feeling of Djuplunda being more of a village does not change. She for example would not want a MAX to come with the development either.

When asked what kind of changes would make the forest unattractive, she answers that if they would not take care of the area, take away the running track or if every 200 meters there would be a crossing with a big road she would not like it anymore. There can be a little more housing around and maybe even in the area, but she does not want it to start feeling like she is walking in a city.

When going back to how she feels about the red listed species, she thinks that in the case that these red listed species are affected by the execution of the development plan, then this would not really affect her. However, she would support an action to help such species survive in the area if it is explained that the species matter for the area. She would not choose the species over the detailed development plan though.

For the future her activities in the area may change depending on her son. If the school would do something or if something with sports changes then maybe this would have an effect on her habits. For her personally she does not think that the execution of the detailed development plan would change anything since nothing that is planned would influence her activities.

Part 3
When we touch upon the topic of groundwater and drinking water she starts by saying she has not thought much about water or that it comes from groundwater, but she knows that in certain places the water is undrinkable or just smells really bad. She would not stand on the barricades to stop the desalinization of water, but she does not think that that is the right way to go. There should maybe be a little more discussion on the topic of water, because she feels like the idea of desalinization of seawater has come by a little too quiet. She does not think that many people are in favor of this. For her it does not matter so much that it will not be more expensive but more that you have to clean the water so much to get it drinkable because the water is so dirty now. She would rather drink water from Djuplunda.

If the water that P18 IK uses for irrigation would get polluted this would not directly influence her, but it would indirectly she feels because they are her neighbors. She does not think that that it would be good if the water would be polluted but explains this is not a topic that she has reflected much upon.

Appendix 2.2 Interview Summary: Atheneskolan

Appendix 2.2.1 Kristin Nilsson, Vice-principle Atheneskolan

Interviewee: Kristin Nilsson
Date: 2014-04-30

Part 1

Kristin Nilsson starts of by giving a history of the school’s location as it largely determines why the school is now located right on the edge of the plan area. She explains that the school used to be in the city where it was surrounded by asphalt and only had some grass which functioned as a soccer field. The school was expanding but it could not grow any further in that location. It was then that this area where the school is now was opened up and it was said that it would be further developed; back then there were only just some companies there. So at the time it felt like it would be a dead area to move to as it was also so much further from the city. However, the building they could move into is surrounded by nature and they felt like that was something that missed in the previous location. So it was the area that made the school decide to move into the empty building. The charm of the area which makes it into a very good area to be in for the school lies in the combination of features the area presents. There are open areas, such as the grass fields taken care of by the soccer club and the more open areas in the forest. At the same time there is the forest are that can give you the feeling that no one has been there and the paths that give a more secure feeling to the children and the teachers. As said, the school really moved out here because of the accessibility of the forest as they really missed the opportunity to go out to the forest easily. Before they would have to rent a bus to go somewhere and such an obstacle often prevents you from being active in nature with school. However, the area is somewhat off route, especially because many children do not live in Visby. So the promise of public transportation to the area in the near future was a premise for moving to the area. Before the busses started to run, they had their own shuttle bus that took the children from the main bus station in Visby to the school.

Kristin explains that the school uses the area almost every day and they use it in different ways. They use it for recreational purposes in the way that the older children can write themselves up for a “forest list”, which allows them to go outside in the break and walk one of the running tracks. This gives them the opportunity to be out for a while, calm down and clear their heads. The youngest that are in elementary school, go out in to the forest with their teacher, sometimes as a planned occasion, sometimes just if it is nice weather. Kristin says that they do not even have to go far often because the children can just get stuck in a spot just around the corner. Something very small can attract their attention, but for they can make it into something very important or fun. The younger children usually walk the shorter 1 km track, whereas the older children may use the longer tracks. But they do not often go into the very southern part of the area. Then there is also the after school leaders that want to work a lot with outside pedagogics and they want to work with things they get from nature. So they take things like wood from the forest and they build something with it; there is even an appointed area for this. Then there is of course also natural science subjects in which the classes go outside when it is about flowers, for example, so that being outside complements the learning material. Twice a year, the whole school even goes out in the forest and follows a track along which there are several activity stations. The younger children are paired up with the older children so they can become familiar with area and so that the children can learn how to work together.
The school has no nature path, but there is a “lost path” and along this path there are several signs about what you should do when you get lost. This is focused on children learning how to conduct themselves if they get lost in the forest. Examples of the signs are how to keep yourself warm and how to make it easier for a search party to find you.

It is difficult to say though how often the children actually use the area on average because it varies depending on the season and on what is being discussed in the different subjects. It varies highly how often the natural science class, such as biology, go outside. As soon as it concern animals, insect or ecosystems or something similar the classes go outside, especially in fall and spring when it is easy to go outside. The youngest classes in elementary school get a square of ground in fall in the forest and then with the class they follow what happens to their square through the different seasons. This is a very popular part of the education. For the younger classes, it can be a very spontaneous initiative to go outside, but for the older children, who see going outside more as a task, the visits are more planned so that the children know that they will be going somewhere that day. She would say, however, that the children that go to the afterschool are in the area several times a week and then the older children may use it for biking and running around as well.

It is because the area is so close that it is so integrated into the school activities, because as she tells it, otherwise you just do not end up going there. She thinks that, in the future, education on nature will become more important. She relates this to the increasing significance of sustainable development in every subject. So she can imagine that in the future there will be more and more subjects there will have an environmental angle.

When asked if there is any nearby area that could replace the area as it is now she answers that of course there are other areas, such as the area to the west of where the school is located now. However, to get there you would have to cross a road and this makes it feel like you are on the way somewhere instead of just opening the gate and being in the forest. There is actually a hill they use for sledge riding there so the children are there sometimes, but it is not the same as the plan area.

Part 2

Kristin knows of the plan and explains that it is mostly the principle of the school that follows the progress of the detailed development plan. The school worries most about how nearby new houses will be built, as it is very important to them to be surrounded by the forest; this is very important to them. What they are afraid of is that the trees surrounding their school will be cut down to make place for buildings such as housing. They think that it is mostly positive with developments such as the sports hall. However, she adds that there is always a danger with exploitation that they will take it further and then start taking away trees around the school to build more.

For example, what if they need more parking lots in the future, you never know. There is always that little feeling of worry. However, it is very positive that they are building the sports hall in an area where there used to just be an empty gravel field.

On the other hand the school is happy that they will be building in the area, because if more houses will be built then possibly families with children would move, which would be good for the school. Also, she mentions that compared to the companies now surrounding them, it would be more fun with some housing. However, what would make the area less interesting for the school to use in their daily activities is if they would extend society into the forest. She further explains this by the example of placing picnic tables and trashcans all around the forest. Something like that would take away that wild feeling the forest now has; that feeling no one else has explored a particular area. She strongly feels that we can sit on tree trunks or just on the ground; why does it have to be so comfortable for people to go into the area? If there are going to be restaurants she would like them to be blended in, like they have done with a restaurant in Örebro. The restaurant has walls with a stealth color and a lot of glass which makes the restaurant not so visible.

We then touch upon some of the more specific plans for the area. She does not think that the camping will be very disturbing as long as it really becomes and stays a health and sports camping as it is now planned. With regards to parking lots she thinks it is fine if the people park around the edges and then walk into the area. If they would start placing the parking lots in the forest so people would drive all the way, that would be borderline. The connection road could maybe disturb the area, especially if they would put streetlights along the road. It does not matter very much if it is an asphalt road, but putting lights on it would make it seemingly take such a large place in the forest. When asked about how she then feels about the lighting along the running track she answers that it is different with the lights along the running track because those paths are not so big and they are not straight roads. Traffic noise is something different again because it is difficult to imagine how much more traffic there will be and consequently how much more noise there will be. The motocross track already gives quite a lot of sound when there is some event there. But Kristin finds it difficult to say anything about how the extra noise will affect the feeling of the forest. However, hypothetically, if it becomes a very big road she does think you would lose quite a bit of the nature feeling in the forest. Also, if the development would really go into the area where
they are most, so the area right next to the school, then that would really be sad because it would really affect their use of the forest.

If the red listed species would disappear this would probably not have an effect on the education, because as far as she knows they do not take up these red listed species in any lessons. But it would maybe be interesting do something with those species in class, to follow them for example, and see how they are affected by the developments possibly.

On a last note: what is interesting is that when you get to a school that is surrounded by forest or nature then you realize that you really miss something at a school that does not have nature around the corner. When it comes to the military traces, she mentions you get used to them and that maybe it would be good if those areas can be used a little more instead of them just standing there.

Appendix 2.2.2 Mats-Ola Jespersson, Parents Council

Interviewees: Mats-Ola Jespersson and his daughter
Date: 2014-04-29

Part 1
Mats-Ola knows the area and uses the running track and also walks in the area south of the plan area with his family. The family also does orientation in the area. The first association Mats-Ola has of the area is “forest”, however, he also knows the rest of the area, the more open and sandy areas from orientation activities. He sees the area as a wild kind of area because it has not been taken care of by the military or since the military left. He also mentions that the area was all military and adds that many people may not have been in the area because it used to be closed off for people. Only those that have a direct need of the area can be found in the area.

According to Mats-Ola is the area in particular appropriate for the purpose of education because it is so accessible for the children and it thus does not require any extra time to leave the area. When asked how the school uses the area, the daughter explains that they use the area, in particular the obstacle course, from the military, in physical education. They also use the nature trail to learn about different species. On the nature trail there are several signs giving some information about species that can be found along the nature trail. Also sometimes during a normal class such as math, the class is taught outside and then items found around them are used for educational purposes. When talking of what makes the area appropriate for education he explains that the area is very accessible because of the many paths but at the same time there is a lot of more wild areas, despite the fact that the military have left prints in the area. He however also recognizes that because of the military activities some species may have appeared in the area. He further does not think that there is an area that is better that could replace the area in its educational function.

The daughter likes being outside in nature with school and Mats-Ola believes that it is an important part of education to be outside in nature because you learn in a different way then and it wakes the children up a little. Mats-Ola is outside with his children often also outside of school and he believes that it should also be the schools assignment to make sure all children spend a reasonable amount of time outside. He would also like his children to get know different species for different reasons. One reason is that is important to know which species are dangerous, but also because it is in itself good to know the different species. His children have learned in school what the different species look like.

Part 2
He thinks it is good that there will be a connecting road because they live south of Vibble and it would improve their traffic situation. He also sees it as a positive development that the motocross riding will be discontinued because of the noise. However, he does believe that too many hard surfaces would make the area less attractive for education. The sport hall is however being built on area that is was just an open field which was previously used by the military. So the development of the sport hall would not have a large effect on the educational function of the area. He does however believe that the effects of the changes such as the connecting road and the sport hall will change the experience of the area as nature for the children. This is because the area is now quite wild, but it will then became a more detailed area which is planned. If even more would be built in the area in the future he thinks this would have a big impact on the areas educational purpose. Lastly, Mats-Ola believes that it is important that children learn about different red listed species so that they can learn that they should take care
of them. If the red listed species would become impacted by the execution of the plan, this would therefore
decrease the areas value for educational purposes.

Appendix 2.2.3 Karin Stephansson, Parents Council

Interviewee: Karin Stephansson
Date: 2014-04-29

Part 1
Karin knows the area quite well because she has used the running track, biked and even worked on the drawings
for the sports hall in her job as a landscape architect. She would describe the area as nature, although there are
quite clear traces of the old military use of the area. The straight gravel roads that cross right through the area,
for example, shows that there has been a lot of activity. She does add that it would maybe be city nature since
you can hear traffic from everywhere.

She thinks that the area is appropriate for the school and for the children to learn about nature. If you want to
learn more about that type of forest, then the area serves its purpose well. She does not visit the area with the
children, she only brings and drops them off. If the family or the children want to go into the forest they will go
into the one that lies close to where they live, because the school is 5 km away.

Her perception is that the school mostly uses the area for physical education and when the children were smaller
they would go for a walk with the children to calm them down. But she does not feel like the school integrates
nature much in their education, not as far as she knows at least. She thinks that they could go more into the forest
even if they have a very large schoolyard. However, she does appreciate it very much when the school does take
the children out into the forest.

She would like her children to learn about the connection within and with nature. What roll people have in
nature, how to behave in nature, but also about the roll we play in affecting the nature. She would also like them
to learn about ecosystems and how it all connects with each other: who eats what and who depends on who. She
also thinks it is fun with all the different species, her children are quite good at recognizing species because she
points them out to her children. She thinks it is important that they learn them. When it comes to red listed
species she does not speak much with her children about them, but would like to see that the school talks about
them.

When it comes to the detailed development plan she thinks that the area that is chosen to become the sports and
recreation area is located strangely compared to town, because the people are not there. The people are in town, so
that means that people will have to go quite long to be able to get there. They have said that they will prioritize
the public transportation and bike roads, but as it looks now with the habits of the people on Gotland she thinks
that everyone will just drive there with their own car to bring and leave. So she thinks the traffic will increase
quite a bit, although she really hopes that they will work a lot on the public transportation. It will have to be at all
times of the day, early and late to match the training schedules. That will require a lot of planning to get it right.
So it is mostly the location of the plan that she thinks is weird and not the actual plan or area. She agrees that the
area where they are building the sports halls was a sort of non-area so in that way it is good to build something.
However, it will take a long time before the rest of Visborg will be a little bit more developed, while the other
facilities will soon be there.

Part 2
When asked how the plan may influence the educational purpose of the area she answers that the crossing traffic,
causing traffic danger and the sounds will make the area a little less appropriate for educational purposes. She
does not think that the execution of the plan will influence the experience of the children. She hopes that maybe
the sports hall will get the children to go into the forest, but she thinks that the building has a more introvert
function and will not end up getting the children into the forest.

When it comes to the red listed species possibly being disturbed by the plans, she thinks that for the bees for
example that there should be some sort of artificial solution to keep them in the area. If she weighs the quite
disturbing motocross racing against the bees she feels she would need to know a little more on the topic form a
strong opinion. She cannot say that she thinks it is bad that the motocross track will disappear. When it comes to
the plants she wonders if they cannot build around the plant and leave it be in that way. All in all she thinks that
there are ways to work around the issues with the species.
Appendix 2.3 Interview Summary: P18 IK

Interviewees: Anders Österberg (Athletics), Johan Lindvall (Soccer) & Börje Siggelin (General club manager)
Date: 2014-04-30

Part 1
Every interviewee is very familiar with the area and each uses the running track personally as well and of course they also make use of the football fields.

When asked to describe the area, Johan answers first and describes the area as an area with a lot of potential that is growing quickly. His first association would not be nature if someone would mention Visborg. Of course that is also part of it but he says, but it is just not his first association as he first thinks of how the area is used. Anders, on the other hand, would say that primarily the area is scenic, especially if you think of the southern part of the area. There are a lot of flowers, especially now in the spring, which is very nice. So when you go out for a run you can really feel like you are in nature. When I ask him about the straight gravel roads, he replies that of course those are not so nice and that at the crossing of the track with the gravel road which will become the connection road several accidents have happened. Now that there are some signs it is better though. Börje agrees with Anders and says that the area is mostly scenic. Of course there are some remnants of the military, but you get used to those. Johan then adds that he does agree that the area is scenic. Lastly Anders mentions that people really take care of the forest to keep it looking good and keep it as a sort of open landscape. In response to the question if they know how the member feel about the area all answer that the members also think it is a very enjoyable area. Johan has received feedback from soccer supporter saying that it is so nice to come to such an area and that is the most scenic football field in Visby. Anders says that he has heard the same and that it also shows that people like the area in how many people use the running tracks.

The club does not use the area for much else than the football fields and the running track and the soccer department sometimes uses the running track for physical fitness training. However, they mention that school often uses the “Dungen” area and that also young families like to go there. There is also some mountain biking, but they do not think it is used much these days and that it was most active the first year. When asked about the suitability of the area for the activities of the club, all agree that the area is perfect for them. They have access to the football fields, the hall and the clubhouse and it is very nice to play soccer on the fields because they are surrounded by green and nature. The relative location to Visby also plays a role says Anders as Börje adds that the accessibility situation has improved as now more busses are coming to the area. Johan explains that for the football club at least it is good that the area is expanding because they will be able to benefit of this.

Börje replies to the question regarding the traffic noise level by stating that at the moment there is not too much of it and that it disturb any activities. There is a lot of people that speeds however and Anders then adds that the amount of the traffic noise has increased since the military left the area. However, so far it has not been a problem, also because it is not around the clock traffic but mostly at certain hours.

Part 2
When we start talking about the plan for area, Börje starts of by saying that it looks like the area will be growing in the future. Currently they do not have many youth members, but that that number fluctuates quite a bit at the club. With the developments all think that more families with children will move to the area which will be greatly benefitting to the club. Although at the moment they cannot take any more members, but cannot afford to lose any either.

They have been promised that the sports hall will not affect the activities of their club. However, as Anders explains, the running track will be affected because they will be moving the start down towards the sports hall. New tracks will be created with new lighting again for the one and two km paths in the new location. However, they do not see this as a problem because it is just a short walk and it is just the way it is. So in general, they are all quite positive to the plan as long as it does not disturb their area too much. Other than that it is positive that they develop the area.

What would make the area less attractive for the club however is if the connection road would become very busy. It is important that the plan for a viaduct is followed so that you do not have to cross the road but can just run under it. As long as they do that then the area will be equally accessible, but if they would not do so then it would disrupt the area because then you end up waiting for traffic lights.
We then discuss certain parts of the plan and talk about how they could affect the club they think that the camping is very positive for the club, Börje will even be working on this. They explain that the camping will have a sports and health goal. This means that when sport teams come to the area they can live a little cheaper in that area. The infrastructure is already there from the old military buildings. It makes it possible that a team can come there and stay for a while, it could also mean that the area is used more for orientation. With regards to the sports hall Börje thinks it will melt into the area, because it used to be a gravel area. For the connection road they think it is ok as long as they stick to the viaduct plan. Then again you never know how much more traffic there will be in area because of the developments they add. It would be very sad if they would lead a lot of heavy traffic onto this road from Toftavägen, says Anders. On the other hand, if it is developed, says Johan, there is a chance that the area is discovered and by a lot more people who would otherwise not have come to the area. So in that ways it might be good for the club.

Part 3

Börje is the one that knows most about the water and explains that they used to use the municipal water for the irrigation of their fields. Currently, the club is only using the groundwater for irrigation and not for drinking water. They are not sure if they will be getting artificial turf to replace the football field, but it is a possibility. If they would do so then they would still need to the irrigation system for the non-artificial turf fields.

If the groundwater they are using now would become polluted they would use the municipal water, which is what they also used to do. Right now they do not use the groundwater they use for the irrigation as drinking water because it is not necessary because they are so well connected to the municipal water and they are not big users of drinking water either.

Appendix 2.4 Interview Summary: CAB Animal & Nature

Interviewee: David Lundgren
Date: 2014-04-29

Part 1

David Lundgren works as a biologist with ”Åtgärdsprogram för hotade arter” in which he specifically works with areas that are not protected nationally but still host threatened species and have high nature values. It is naturvårdsverket that points out some species or biotopes that need some more protection and Länsstyrelsen then tries to takes extra care of those species or biotopes by clearing the area or letting grazing feedstock in the area. He for example works a lot with the motocross circuit in the south of the plan area because of the bees and insects that live in the sand.

He describes the area as nature as dominated by pine forest with many trees are about 100 years old, but some are 150-250 years old. The geology of the area is dominated of glaciofluvial deposits with sand and gravel, which is important for plants and insect species. The Sand Martin that breeds there according to the nature inventory is unfortunately no longer present according to David as the high sand heaps in which they dig their nests have been taken away. This has nothing to do with the detailed development plan, but there is some talk of recreating a biotope in which they can breed. In reaction to the statement that the area seems almost more of a park, he explains that along those gravel roads there is actually a lot of different species to be found and that these roads actually contribute to the nature value of the area.

David explains that there are many aspects to protecting threatened species. One of these aspects is that each specie has the right to exist, but some species have a very specific function for society. The bees, for example, that live in the sandy areas are important for the pollination of the flowers in and around the area. This again connects to society in the way that people like to enjoy nature and the pollination thus contributes in an indirect way by taking care of the pollination of the plants.

When asked why such an area as the plan area is important for society, David explains that with the growing of Visby it will be important that there are patches of nature such as this one for the people to enjoy nature and have a space for recreation. Even for the people that may not live close to this area it is important to keep this area as maybe their children or grandchildren will be able to enjoy this area in the future. Also, regarding the future it is important to look at the precautionary principle since we may not know the every relationship there is in nature and it therefore important to tread carefully as we do not know what the future holds. Even those species which
are almost threatened and not threatened yet are important to keep safe as they may become threatened otherwise in the future.

Part 2
David is not very familiar with the plan, but based on the impact assessment he believes that all the activities can be done in good balance with the nature values.

The discontinuation of the motocross track creates a problem for the species living in the area as it is the disturbance of the racing that keeps the area from growing tight with plants. However, there will be attempts to find another activity that will provide the same level of disturbance, without the negative side effects like noise that come with motocross. When asked about the effect on society if some species would disappear he stresses the importance of the presence of bees in the area and explains that the wild bees that live in the area are actually better at pollination than the normal honey bee. It is also again here that is important to use the precautionary principle: we should not destroy something of which we do not know what the result will be.

This area is not easily replaceable by another area close by since the area has a very unique combination of fungi, insects and sand-dwelling wasps and it is even very accessible due to its very favorable location close to Visby.

Appendix 2.5 Interview Summary: CAB Environment & Water

Interviewee: Emilie Vejlens
Date: 2014-04-28

Part 1
The CAB works partially with the monitoring of water quality and quantity. They also work with the water protection areas as a way of keeping good water quality, by working with those that want to develop in those areas. Emilie knows the area but is not very familiar with the area, but has used the running track. At the CAB she works mostly with the goals and not directly with nature.

Groundwater is very important for Gotland, for drinking water, irrigation and for animals to drink water. It is important now and it will be important in the future to be able to continue to live on Gotland. You thus need to make sure that the quality is kept high. In the water plan for Gotland the use of desalinization of seawater is proposed to complement the drinking water supply when there is a higher demand for groundwater. However, she thinks there is a risk that this may lead to people thinking it is less important to protect the groundwater because you could switch to seawater. However, regardless of the seawater alternative, it is important to keep the quality high for the future as well because no one knows if there is any cocktail effect with all the chemicals used in cleaning seawater or polluted groundwater. So you have to think of the precautionary principal in this case. The CAB tries to communicate the importance of groundwater to society which is also something that is done with the work on the environmental objectives.

When comparing the importance of protecting smaller groundwater wells in comparison to the larger ones, it came forward in that in the first hand the largest wells are important. However, it is discussed within the CAB and the municipality that the aim is to protect all wells and not just the larger ones. This is their translation of the environmental objective and this even means that even those wells that are only used privately are protected against pollution in the environmental objective work.

In the case of an increase in the use of the groundwater, smaller groundwater wells will become more important and it is then very important that these smaller wells are clean. However, now with the technique of the desalinization of seawater may change this importance in the future.

There is no particular conception that groundwater from Gotland is any extra special in comparison with other tap water in Sweden. However, there is an opinion that groundwater is better than the desalinated seawater as all the minerals would have to be added to the seawater before it can be drunk. She tells that there is now a debate starting on this in society, which is shown in the local newspaper Gotland Allehande. Another discussion is that the groundwater is as good as the bottles of water that are sold everywhere.

Part 2
Emilie knows the detailed development plan, but is not very familiar with it. She believes that the plan should be good for the area, however, the rainwater management has not been finalized and it is these things which are very important.

When it comes pollutions, it is the municipality that takes care of the quality checks of the wells and depending on the pollution there may be different solution to solve the problem. Some of the checks are done frequently and regularly and there are some checks that are done randomly. They work with measures to prevent the pollution of wells as well, the water protection areas is one of such measures. If the groundwater in the plan area would be polluted the consequences depend on what kind of pollution it is. If the water can still be used for the irrigation, but is not as clean anymore there is not a large problem. However, if it could not even be used anymore for the grass then larger effects may occur, even on society. In this case the water would have to be taken from another source and this would then have an effect of the amount of available water for society.

In longer perspective it is important to look at the climate predictions for Gotland in which it is predicted that there will be longer and more intense dry periods which would make every groundwater well more important for irrigation for example.

Appendix 2.6 Interview Summary: Swedish Society for Nature Conservation

Interviewer: Jakob Wallin
Date: 2014-04-29

Part 1
When asked to describe the area he compares it to a forest east of Visby in the way that it has a lot of sand layers. Then he describes the area to have a lot old pine forest which is quite scattered, but he would say that it has a nice forest feeling which has a main land character. He then adds that if you are interested in insects and bees it can be very interesting with the sandy ground. The running track is of course also very nice, and although he has not used it much he knows that it used very often. It gives some recreational value as well. He would definitely describe the area as nature, but it is impacted by humans at the motocross circuit and the military buildings. But then again he can go to the motocross track and get one of the biggest nature experiences because of all the insects that live there.

When I ask about the workings of the SSNC he explains that the regional SSNC groups work a lot with nature’s own value and the species, but that on a national level it is more about a larger perspective. Then they also work with sustainable development which is a good system and then for example with these bees there is a pollination ecosystem services. However you cannot know how much one bee species contributes to that; it is about the whole system. So you should protect them all, also just be safe.

When asked about how society enjoys such a piece of nature he mentions that he goes to the area with his friends who are all interested in bugs and then there may be some others that do that. He thinks though that most people use mostly the running track. But then eventually if more people would live there it would also be used more for picking mushrooms he can imagine. When the whole of Visby develops, it will definitely be the nature area that is closest by for many, so it will definitely be good to just go out into the forest for them.

SSNC does not use the area much as they mostly go to other areas like the Hällarna. But he does think that it might be interesting for them to use the area because it would be also good to not only show areas that are untouched. They could definitely use the motocross circuit so show how species are dependent on human disturbance, so it could be good to try it out. He goes there sometimes in any case.

Part 2
Regarding the plan he is somewhat critical, because it is not good if they have to take away a lot trees or soil to build and develop. But if they manage integrate it well and save a lot of area it is ok, he guesses. But then again it feels like they are trying to draw out Visby further out of the city and then you also are supposed to drive there, which he is a little more critical towards. It would be better if you can keep such an area a little more within Visby.

When asked about the Sand Martins he explains he does not know about birds and that insect are more his area and that is why he is mostly worried about the motocross track. So when we move on the red listed species, he
first expresses his bias towards insects. He then explain that he feels that the motocross circuit is biggest threat to any of the red listed species in the area, because those red listed bees are really dependent on the motocross activity unless they would maintain the circuit as is now. The bees often like to live in the sides of the track or where they jump, because it is very rich with flowers, it is sunny and sandy. This is because the clear the area there, but if they would stop that then the bees’ living area would become quite scarce. So he feels that it would be best if they let the motocross racing continue, although he of course understands with all the noise it is not favorable. So then they will really have to come up with a solution. Concerning the alternative plan of a BMX track instead he says that he doubts that will happen and that the area will then also not be cleared to the same extent. So he thinks that you would really need a measure to protect them. When asked if that is where the SSNC would get involved, he expresses the feeling that the CAB and municipality should also be responsible for keeping those species. He knows that the CAB does work on that but he is not really familiar with it. He explains that there was some plan to exploit the Hällarna as well and that is not a protected area either. But then they worked really hard against this and to make it into a protected area. Partially, he says, we are also an organization that is asked for advice when the governmental authorities make decisions. So, for example, they could be asked to get involved with the motocross circuit. He explains that they cannot be against every development, because now they have just said no the exploitation of the Hällarna. Also they are going to let a lot of the area be, because of its recreational purpose. With the camping, for example, they can try to leave as many old trees as possible.

About what it would mean for society if some red listed species would disappear is that the species-nerds will not go there anymore and of course it would just not be good for society’s own sake. If the bees disappear in the motocross area you will also cause a sort of fragmentation for those bees that have nearby populations, which would create a future threat for those populations. So it is important to keep the red listed species, because we need the species and there is a reason that they are red listed. If with every detailed development plan one or two species disappear then that in total that would have a really bad effect. It is interesting as well that it happens very seldom that when one species disappears because of a detailed development plan that another one will appear or get a better chance.

He thinks that the connection road could maybe bring some more people to the area, because more people will pass by naturally. But then again after the military leaving, the area feels a little wild as well and that in a way increase the nature experience. So there is a risk that that feeling diminishes from the building of such a road. But he does not think that the sports hall and the road will impact the feeling too much when you are really in the forest.

Appendix 2.7 Interview Summary: Gotland Ornithological Society

Interviewee: Clas Hermansson
Date: 2014-04-29

Part 1
The ornithological society was unaware of the possible place for the birds to breed, but then again he explains that there are not many reports of Sand Martin colonies in the database they use. There are neither many people that go and look for them in places like the motocross track, as it is not an attractive place for bird watchers.

The birds dig a new hole or improve the old one every year so they need heaps of very loose sand and the circuit does have a lot of loose sand. He does not think that the circuit is such a great place for the birds to breed but that there is sooner just such a lack of places for these birds to breed that they even go to the motocross track. Most of the birds breed on the main land, but it is still important that they stay on Gotland because they have been part of the ecosystems for a long time so if they would disappear this may affect something else. Gotland is predominantly of limestone so that is not ideal for the Sand Martin, but there are some areas where there is some dirt over the loose stones and then they dig themselves in there.

Sand Martins are an appreciated bird, because they are supposed to show that summer is coming. So it is an appreciated bird, but they are very difficult to find because they lead their own little life in areas when there no people. So many people do not realize the difference between the Sand Martin and just swallows. Not many reports come in every year about the breeding places of Sand Martin.

Part 2
If the motocross racing would disappear then at least you could hear the birds, but he does not think that it would then become an area that would attract bird watchers. He adds that even if this place would disappear then the species would not get more threatened, because it was the in the 70s and 80s that the numbers were declining, but since long have they stabilized. So even if the species is red listed, their numbers are not declining so they are not about to die out. But on Gotland there are very few; the colonies are usually 20 pairs on Gotland. However, it is in their survival strategy to find new places to breed, so if this place would disappear then they would just find a new place. That is what they have done already now probably.

Even if they would recreate the breeding area and then they would take away the motocross track then it would still not be very attractive for bird watchers. They could create an attractive breeding place but these places are often not good looking so people would not want to go to an area like that so still no bird watchers would go to look at the Sand Martin.