

*in search for*  
**SUSTAINABLE  
ALTERNATIVES**  
*to LAWNS*  
*- connecting research  
and landscape design*



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## *Foreword*

During our landscape architecture studies we have grown an interest in landscape architecture as a unique link between the built environment and wild nature. Attempts to find sustainable creative design solutions have always been important during our landscape architecture education.

Besides our studies we have both been working with greenspace management. We have become aware of how much time and effort in this field is dedicated to maintaining lawns. We reacted to the amount of lawns present in the urban landscape and how homogenous they are in their appearance. We started to ask ourselves why lawns are such a common feature in urban landscapes and why they have to always be so monotonous and static in its appearance. Searching for a subject for our thesis work we came across Maria Ignatieva's research on sustainable lawns and upon her encouragement, decided to write this thesis in relation to her research project about "Lawns as an ecological and cultural phenomenon in Sweden". The main goal of this essay is to find possible alternatives to traditional lawn that can be cost effective, biological diverse and aesthetically appealing. We hope that proposed new generation of sustainable lawns can be widely implemented in the practice of landscape design.

### *Thanks!*

During the fall 2013 we have written this thesis about sustainable alternative lawns. We want to thank our supervisor Maria Ignatieva for her comments and support. Without her this essay would not have been the same. We also want to thank the lawn research group for letting us be part of their research project and participate at meetings and workshops. We would also like to thank Jordan Lane and Mathias Monarque for their help with editing of text and movie.

# ABSTRACT

This master thesis in Landscape architecture is written in collaboration with a research group at SLU running a project titled “Lawns as ecological and cultural phenomenon in Sweden”. The objective of this thesis is to investigate the phenomenon of lawns in Sweden in relation to ongoing research and to propose a design for a demonstration-trail at the Campus in Uppsala, where sustainable alternatives to conventional lawns can be displayed and evaluated.

Lawns are homogeneous and show little difference in structure, composition and cultural characteristics. Since the lawn is a cultural product its appearance is highly dependent on perpetual maintenance which makes the conventional lawn a source of pollution due to mowing and herbicide application. Therefore there are reasons to question the conventional lawn from a sustainable point of view. Approximately in Sweden 80 000 ha of maintained grass lawns are part of public courtyards, schoolyards, parks, golf courses, sport fields and traffic environments. Lawns have become a universal phenomenon through the dispersion of landscape aesthetics from the Western world. Advertisers, investors and developers are also contributing to making the lawn a consuming product that is well depicted in media.

The aim with the literature study is to explain the lawn as a phenomenon today, how it was developed throughout garden history and what it could possibly look like in the future. The thesis includes a review of the lawn history from a Swedish point of view and show examples of alternative suitable lawns. To be able to discuss lawns and alternatives to lawns from a sustainable point of view the thesis includes a shorter review of ecosystem services. Literature review, case studies, workshops (with the research-group and stakeholders) has been analysed and interpreted in a design solution of a demonstration trail at Campus Ultuna.

With more knowledge about lawns from an ecological as well as a cultural point of view designers can develop and implement sustainable alternatives in an urban context. The design proposal works as a knowledge garden, in form of a trail that can both be a test site for the LAWN research group and an inspiration-site for students and visitors at Ultuna Campus. Since a conventional lawn is strict and non-dynamic we developed a design that is free and changeable. The demonstration trail displays eight examples of ecological, social and economic sustainable

alternatives to the conventional lawn. The proposed lawn alternatives are adapted to the habitat at the site, have a dynamic aesthetic expression and consist of native flora. The trail has been designed as a conceptual project that hopefully could be implemented in the nearest future.

Considering today’s trends to aim for sustainable development the future looks promising for sustainable alternatives to lawns to be implemented. To replace the conventional lawn with more diverse alternatives can be a great investment for future climate challenges and biodiversity loss. However there are three main factors that create challenges before reaching the goal of a more diverse urban outdoor environment.

- There is a lack of knowledge in the subject, both among professionals and the public. During our literature studies we found that there is a lack of information about the history of lawn planning from a Swedish perspective. We also had difficulties in finding information about lawns in relation to ecosystem services. When lawns and ecosystem services were analysed the lawn was compared to a paved ground cover and therefore seen as a sustainable alternative in an urban context.
- A main issue to apply alternatives with a high biodiversity is peoples view that an urban area should look “neat” and the environment be well maintained. This view comes from globalization, media, social pressure, and the perception of seeing nature as something wild that needs to be controlled. The lawn has through history become such a common feature in the urban environment that it is difficult for people to imagine other alternatives.
- Today there is often no long term planning and ecosystem thinking in the greenspace management sector. This is a problem since the alternatives require different types of maintenance and the right balance between disturbance and stress. With a closer collaboration between the planning and the management sector a more sustainable environment could be achieved.
- Since lawns cover such a large amount of open space in urban areas we found that these needs to be discussed as whole ecosystem. In that way it is clear that these areas should provide ecosystem services from all four ecosystem categories, cultural, provisioning, supporting and regulating and not mainly be a provider of cultural ecosystem services.

# SAMMAN- FATTNING

Detta är en magisteruppsats i landskapsarkitektur gjord i samarbete med en forskningsgrupp på SLU. Mellan år 2013 och 2016 undersöker forskningsgruppen gräsmattan utifrån ett ekologiskt och kulturellt perspektiv i Sverige. Syftet med uppsatsen är skissa fram ett designförslag på en demonstrationsträdgård på Campus Ultuna för att visa exempel på hållbara alternativ till den klassiska gräsmattan. Målet är att demonstrationsträdgårdens användas till studier av forskningsgruppen samt som inspiration till förändring av den klassiska gräsmattan i urbana miljöer. För att kunna föreslå hållbara alternativa gräsmattor har vi analyserat gräsmattan i linje med den forskning som pågår samt gjort historiska, kulturella och ekologiska efterforskningar kring den klassiska gräsmattan.

## Metod

Magisteruppsatsen är uppbyggd utifrån tre olika metoder litteraturstudie, fallstudie och en designdel som inkluderar platsanalys och visualisering. Syftet med litteraturstudien är att ge svar på vad en gräsmatta är, och hur den har sett ut och använts genom historien. För att kunna föreslå alternativ till den klassiska gräsmattan har vi beskrivit gräsmattans fysiska struktur samt analyserat gräsmattan ur ett kulturellt perspektiv. För att finna alternativ som är mer hållbara än den klassiska gräsmattan, har vi valt att analysera gräsmattan och relevanta alternativ med utgångspunkt i ekosystemtjänster.

Fallstudiedelen består av tre olika projekt, där andra alternativa gräsmattor har utvecklats. Genom fallstudier och litteraturstudier kom vi fram till vissa slutsatser som är viktiga att tänka på när man utvecklar alternativa gräsmattor i urbana miljöer. Dessa slutsatser har vi använt oss av under gestaltungsprocessen och kallar dem för design "tools" (designverktyg) och design "aim" (designmål). Designverktygen inkluderar växtmaterial, skötsel samt sociala preferenser. Dessa faktorer har vi arbetat med för att utveckla alternativ så att vårt designmål kan uppnås. Designmålet är att skapa alternativa gräsmattor som kan producera fler ekosystemtjänster i jämförelsevis med den klassiska gräsmattan.

## Bakgrund

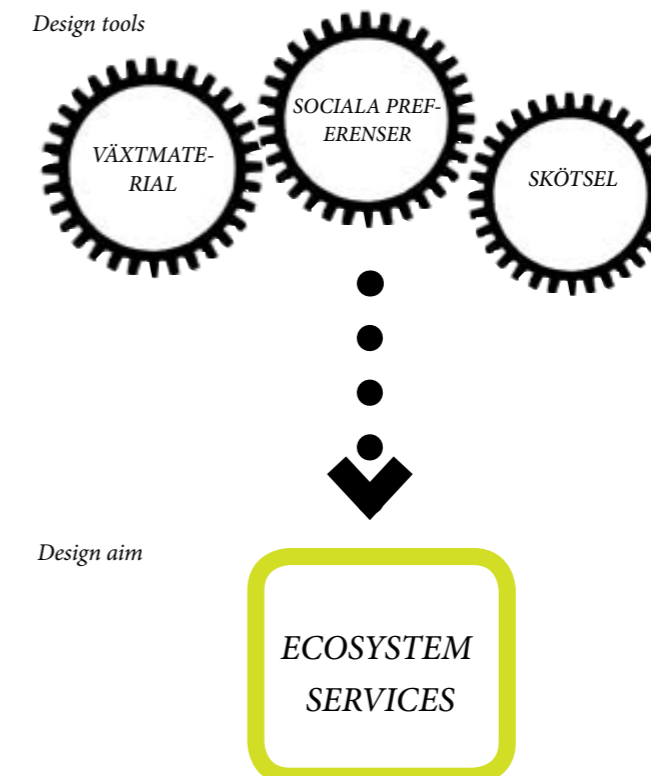
I Sverige täcker gräsmattan ca 80 000 hektar och är del av offentliga gård-

ar, skolgårdar, parker, golfbanor, idrottsfält och trafikmiljöer täckta med gräs. Gräsmattor är inte bara vanliga i Sverige utan har blivit ett globalt fenomen genom spridning av landskapsestetik från västvärlden. Gräsmattor ser likadana ut, har samma struktur och består av samma arter över i princip hela världen. Gräsmattor är designade för att se välskötta och frodiga ut. För att uppnå detta behövs ett ständigt underhåll i form av klippning och gödsling som leder till föroreningar av både luft och mark. Dess låga artsammansättning skapar en homogen artsammansättning i urbana miljöer vilket har en negativ påverkan på världens biodiversitet.

## Hållbar utveckling

I denna uppsats ifrågasätter vi gräsmattans utbredning ur ett hållbarhetsperspektiv, och menar, att den i flera urbana situationer kan designas annorlunda för att kunna erbjuda ekosystemtjänster som är nödvändiga för en mer hållbar urban framtid.

Ekosystemtjänster är de tjänster och produkter människor får av naturen så som mat, hälsa, rekreation, utbildning, pollinering, biodiversitet, luft, och vattenrening. Ekosystemtjänster är uppdelade i fyra olika kategorier; understödjande, reglerande, kulturtjänster och tillgodoseende.





För att skapa en hållbar stad är det viktigt att staden ses som ett ekosystem och den konventionella gräsmattan som en del av detta. Eftersom gräsmattan täcker upp till 70 procent av det öppna landskapet i de flesta av världens städer skulle en förändring av dessa ytor kunna tillhandahålla en stor variation av ekosystemtjänster. I dag är gräsmattan viktig i den bemärkelsen att den skapar förutsättningar för sociala möten, sport och rekreation. Gräsmattan bidrar på så vis främst med kulturtjänster. Vår vision är att gräsmattan, den största marktäckaren i staden, utöver detta bidrar med ekosystemtjänster från de andra tre kategorierna som innehåller bland annat pollinering och biodiversitet.

### *Design*

Demonstrationsträdgården fungerar både som en testplats för forskargruppen och samtidigt till att inspirera och informera studenter och besökare till att skapa hållbara alternativa gräsmattor. Eftersom en vanlig gräsmatta är strikt och statisk, har vi skissat fram en design som är fri och dynamisk. Demonstrationsträdgården består av åtta exempel på ekologiska, sociala och ekonomiskt hållbara alternativ till gräsmattan. De alternativa gräsmattorna är anpassade till habitatet på platsen, har ett dynamiskt estetiskt uttryck, och består av den inhemska floran. Platsen har designats som ett konceptuellt projekt som förhoppningsvis kommer att genomföras inom den närmaste framtiden.

För att alternativen skakunna användas i en urban miljö var det viktigt att finna en design som kan visa exempel på hur alternativa gräsmattor kan användas i olika urbana situationer. För att skapa en koppling mellan SLU och en urban miljö studerade vi hur den konventionella gräsmattan ser ut och används i Uppsala. Genom denna studie fann vi åtta olika situationer där gräsmattan förekommer.

Utifrån dessa åtta olika "situationer" har vi skapat åtta olika alternativ till gräsmattor.

#### *PASTURE LAWN (Betesgräsmatta):*

Betesmarker är kulturbetingade miljöer. Landskapsparken är ett exempel där betande djur var ett sätt att hålla gräset kort och landskapet öppet. Betesmark är ett alternativ till den klassiska gräsmattan, som kan berika den biologiska mångfalden av hotade arter och minska underhållskostnader på lång sikt.



*Example of lawn in urban area that is not used for social activities. Uppsala. Photo: Julia Vilkénas 2013.*



*In some areas the lawn is used for social activities and sport, these possibilities are important to have in an urban area. Uppsala. Photo: Julia Vilkénas 2011*





*I förgrunden en skuggängsgräsmatta och längre bort en Betesgräsmatta.  
Kollage av: Ameli Hellner och Julia Vilkénas*



*Grusgräsmatta.  
Kollage av: Ameli Hellner och Julia Vilkénas*

*MEADOW LAWN* (Ängsgräsmatta): är ett alternativ med inspiration från den klassiska svenska ängen. Detta är ett billigt alternativ till den klassiska gräsmatta, eftersom det kräver mindre skötsel och enkelt kan anläggas genom sådd. Ängsgräsmattan kan skapas med många olika växter och bidrar till biologisk mångfald och pollinering.

*PICTORIAL LAWN* (Pittoresk ängsgräsmatta): i vårt förslag består den pittoreska ängsgräsmattan av annueller som blommar med mycket starka färger. Ettåriga blommor kan användas för att komplettera ängen under det första året, innan ängen har etablerats.

*GROVE LAWN* (Lundgräsmatta): inspiration till detta förslag kommer från lunden, som är en biologiskt rik miljö med träd och låga marktäckare av växter, som är anpassade till en skuggig livsmiljö. Lundgräsmattan underhålls med lie och slåttern sker en gång per år efter blomningsperioden i augusti.

*GRAVEL LAWN* (Grusgräsmatta): grusgräsmattan är utformad för att passa på torrare områden i en urban miljö, där gräsmattor är svårta- blerade. Grusgräsmattan är utformad med växter som är anpassade till soliga, torra och sandiga klimat. Grusgräsmattan är utvecklad till att vara speciellt gynnsam för bin och andra insekter som bygger bo i sådana marker.

*HERBACEOUS BORDER LAWN* (Blommande gräsmattkant): i både trädgårdar och innergårdar är gräsmattor viktiga för sociala och estetiska värden. I dessa situationer är dock sällan så att hela gräsmattan används för sociala aktiviteter och måste kunna motstå slitage. Ett alternativ för att reducera mängden av gräsmattan, är att anlägga en blommande gräsmattkant, med perenna inhemska blommor.

*GRASS FREE LAWN* (Gräsfri gräsmatta): gräsfri gräsmatta är ett koncept av en gräsmatta som inte innehåller några gräsarter. För att ha en hög biologisk mångfald är det viktigt att gräsmattan klipps ca fyra fem gånger per säsong, vilket skapar en balans mellan arter. Detta är det alternativ som är mest likt en vanlig gräsmatta då den klipps med en gräsklippare. Den består av kort vegetation och går att sitta på.

*SPONTANEOUS LAWN* (Spontan gräsmatta): den spontana gräsmattan är ett experiment som visar på det växande mönster som skapas i övergiv-



na områden. Här lämnas jorden bar och växter etableras från fröbanken eller fröspridning genom luftvägen.

### *Diskussion*

Syftet med avhandlingen var att hitta inspirerande alternativ till gräsmattor som är hållbara genom att öka ekosystemtjänster i städer. Detta är av stor vikt eftersom ekosystemtjänster på jorden snabbt minskar och förlusten av biologisk mångfald är stor. Idag består upp till 70 procent av öppna ytor i de flesta av världens städer av gräsmatta och dessa gräsmattor bidrar främst med rekreativsmöjligheter till stadens befolkning samt är dekorativa. Vi anser att stor del av gräsmattan kan bytas ut i urbana miljöer och därmed bibehålla de kulturella ekosystemtjänsterna och samtidigt försätta att fylla sin funktion som exempelvis umgängesplats. På så sätt skulle en stads marktäckare kunna erbjuda ekosystemtjänster ur alla fyra olika kategorier.

Att byta ut gräsmattan till mer varierande alternativ kan vara en bra investering för framtida klimatutmaningar och förlust av biologisk mångfald. Det finns dock några faktorer som kan få utvecklingen av hållbara gräsmattor att avstanna.

Under våra litteraturstudier fann vi att det inte finns mycket information om gräsmattans historia utifrån ett svenskt perspektiv. Det var också svårt att hitta relevant information om gräsmattor i förhållande till ekosystemtjänster, eftersom gräsmattor ofta jämförs med en hårdgjord yta och därför uppfattas som ett hållbart alternativ.

Att implementera alternativ med hög biologisk mångfald är en utmaning, då människors syn på en urban miljö är att det skall se välskött ut. Denna uppfattning kommer från globaliseringen, media, socialt tryck och uppfattningen att naturen är vild och måste kontrolleras. Gräsmattan har genom historien blivit ett så vanligt inslag i stadsmiljön, att det är svårt för människor att föreställa sig andra alternativ .

I dag saknas det ofta en långsiktig planering och ett ekosystemtänkande i parkförvaltningen. Detta är ett problem, eftersom alternativa gräsmattor- kräver olika typer av underhåll med rätt balans mellan störning och stress. Vi tror dock att det finns stora möjligheter att uppnå en mer hållbar urban miljö med ett närmare samarbete mellan planering och förvaltning.



*Ängsgräsmattan.  
Kollage av: Ameli Hellner och Julia Vilkénas*



*Gräsfri gräsmatta.  
Kollage av: Ameli Hellner och Julia Vilkénas*

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- \_Audiance*
- \_Definitions*

## *Introduction*

Humans in urban areas are highly dependent on the different services that nature provides. Since ecosystem services today are decreasing rapidly it becomes an urgent matter to create sustainable urban areas where humans and nature can coexist (Colding 2013).

A large part of Sweden's green, urban landscape is covered by lawns. Approximately 80 000 ha of maintained grass lawns are part of public courtyards, schoolyards, parks, golf courses, sport fields and traffic environments. Beyond this figure, the lawn is also an essential element in most private villa-gardens (Persson & Wallin 1990). Lawns have become a universal phenomenon through the dispersion of landscape aesthetics from the Western world (Ignatieva 2012). Advertisers, investors and developers are also contributing to make the lawn a consuming product that is well depicted in media (Robbins 2007). In Europe around 80% of all park surfaces are occupied by lawns, which are homogeneous and show little difference in structure, composition and cultural characteristics. Since the lawn is a cultural product its appearance is highly dependent on perpetual maintenance which makes the conventional lawn a source of pollution due to mowing and herbicide application (Ignatieva & Stewart 2009). The dispersion of lawns also leads to a homogenization of plant material that is a threat to urban biodiversity (Ignatieva 2012). Even though there are many wild living grass species in Scandinavia only a few of these are used in today's lawns. Lawns in Sweden mostly consists of *Festuca rubra* and *Poa pratensis*, which both stand the cold climate well, *Agrostis capillaris*, *Phleum pratense* and *Agrostis stolonifera* which are common in ornamental lawns and *Lolium perenne* which is used in the south of Sweden. *Lolium* is one of the most common species in many other parts of Europe. Generally speaking all these species are derived from grass crops which were used as mash. It means that these grasses can grow fast and high if they are not cut down regularly (Persson & Wallin 1991).

Today lawns are seen as a natural part of the urban landscape without questioning their functional, ecological or aesthetic value. There are few Swedish studies of the motives to today's planning and management of different kinds of lawns (Ignatieva et al. 2013). At SLU an interdisciplinary research group have therefore started a research project about

lawns as an ecological and cultural phenomenon in Sweden. As part of the research project the LAWN-research group have the intention to do a test site for "alternative lawns" at SLU where alternatives could be demonstrated and evaluated. The demonstration site was proposed to be developed by a landscape architect student. Since we found this subject very important we decided to dedicate our master thesis to a search for sustainable alternatives to lawns.

## *The research*

The LAWN research-group consists of an interdisciplinary team of biologists, sociologists, landscape architects and experts in soil and carbon sequestration. The research on lawns is a FORMAS funded project that started 2013 and continues until 2015. As long term objectives the research group intend to "deliver results in the form of an urban greening manual, demonstration sites, and different management packages for municipalities and communities with recommendations on how to establish and manage sustainable lawns" as well as "be a model for future interdisciplinary studies of lawns in Europe" (Ignatieva et al. 2013). During 2013 a first pilot study has been conducted and workshops have been held with stakeholders and scientists from Sweden and abroad: landscape architect Dr. James Hichmough, PhD student Lionel Smith, lecturer Tim Delshamar, pollinator specialist Dr. Katherine Badlock and the head of greenspace management in Uppsala municipality Per Westerlund.

## *Our role in the project*

To be able to mediate the research about lawns to the public, stakeholders and professionals the research group intends to implement a demonstration trail that shows different alternatives to lawns at SLU, Ultuna. During the autumn we have taken part in ongoing research and participated in meetings and workshops. Our role in the project has been to propose a design in relation to the research but we have been given creative license to interpret the task and to develop our own conceptual design. We decided to make a proposal that reflects our literature studies and results of project workshops.



# INTRO- DUCTION

## *Objective*

The objective of this thesis is to investigate the phenomenon lawn in relation to ongoing research about sustainable lawns in Sweden and propose a design for a demonstration-trail of sustainable alternatives to lawns at SLU Campus.

## *Research questions*

1. What is a lawn from ecological and social point of view and how has the lawn been used in Swedish landscape design through the history?
2. What are the advantages and disadvantages of lawns and how can designers develop alternative lawns taking into consideration ecosystem services thinking?
3. What could an alternative sustainable lawn look like in the Swedish urban landscape and how can alternatives be communicated through a demonstration site at Ultuna Campus?

## *Method and implementation*

The work process started with a literature review that was done in parallel with the site inventories and analysis and reflections over the design of the demonstration trail. As we deepened our knowledge in the subject new questions were raised and new areas of interest were investigated. In the process different methods have been used to investigate the phenomenon of lawn and to design a demonstration site.

## *LITERATURE STUDIES*

The first part of the literature studies answers the question: “What is a lawn from ecological and social point of view and how has the lawn been used in Swedish landscape design through the history?” To be able to analyse and explain why lawns are such a common feature in our outdoor environment we wanted to give an insight of the history of Swedish lawns. We started by talking to our supervisor Maria Ignatieva, an expert on the subject “lawns” and she provided us with the relevant literature. We also used the search sites Libris and Epsilon where we used the words (in both English and Swedish): lawn, history + lawn, definition + lawn. We went through reference lists from other essays in the same area of subject and found more relevant references. This literature review gave

us general information about the origin of the lawn with an American and European perspective. We struggled to find information that was directly connected to the Swedish aspect of lawns. To get a better insight in the Swedish context we started to look into the history of Swedish landscape architecture. We searched for literature in the search pages Libris, Google and Google Scholar with the words (in Swedish): Swedish + landscape architecture, lawn + history, Sweden + garden + history. Since we did not find any source that was only about the origin of the Swedish lawns we looked into the history of Swedish landscape design in general and picked out parts that concerned the history of lawns.

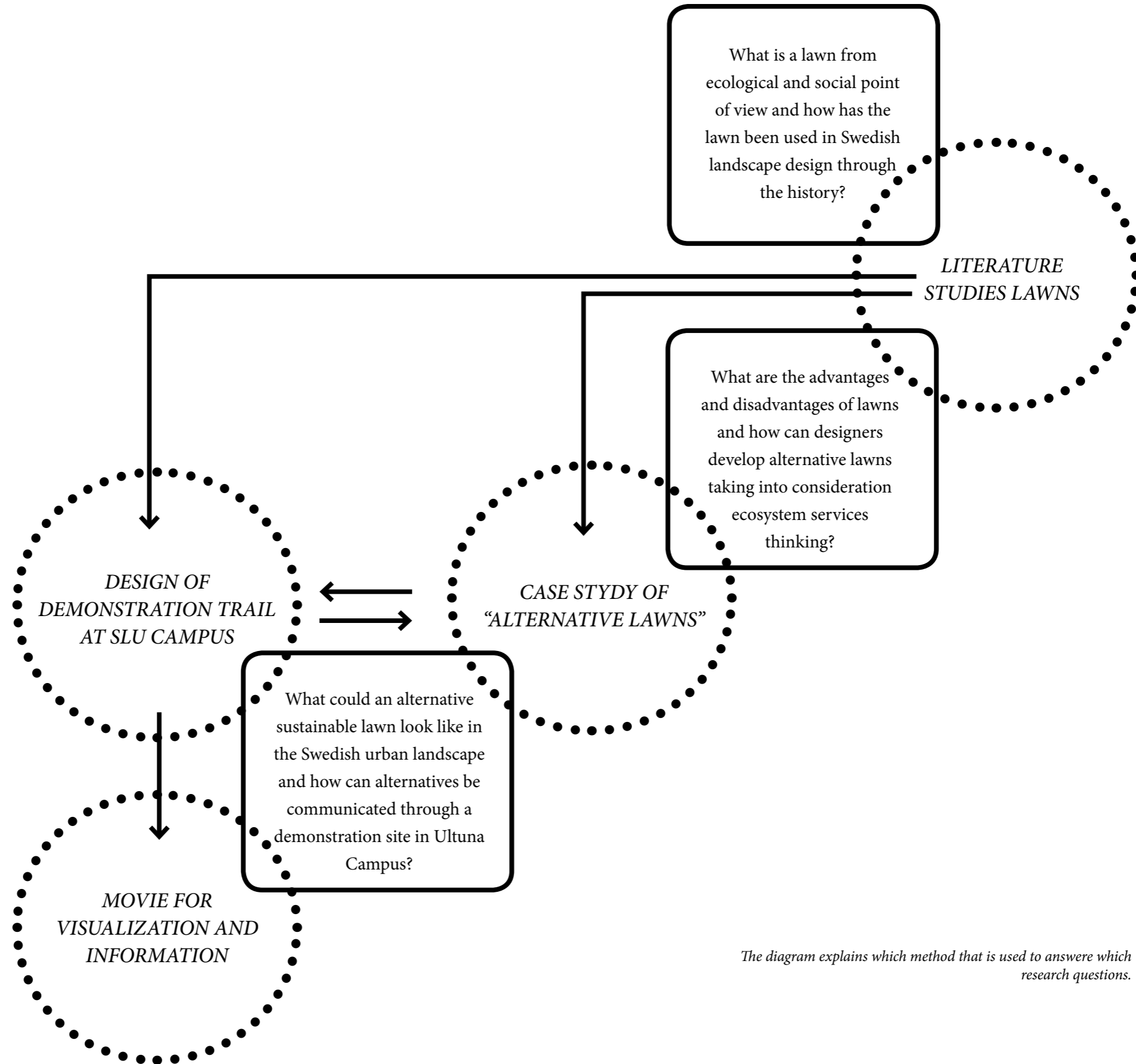
The second part of the literature studies addresses the question: “What are the advantages and disadvantages of lawns and how can designers develop alternative lawns taking into consideration ecosystem services thinking” To avoid of using a very broad understanding of sustainability we chose to study more in depth the concept of ecosystem services. Special areas of the subject such as social preferences and maintenance were also investigated since they are related to the phenomenon lawns. Here we used similar method as the first part where we searched on the sites Epsilon, Libris, Google Scholar, Artikelsök and Google with the words (both in Swedish and English) as: Ecosystem services, ecosystem services + lawn, Ecosystem services + evaluation, Ecosystem services + urban, Sustainable + lawns, sustainable + urban + design, maintenance + lawn. A main part of the information we found about sustainability considered meadows. There was no information about what kind of ecosystem services lawn can provide except noise reduction and cooling effect in comparison to paved surfaces. In the section about social contradictions of lawns we recorded and analysed data from meetings and workshops of the LAWN research group which we were attending..

## *CASE STUDIES*

The case studies answer to the question: “What could an alternative sustainable lawn look like?” We investigated three case studies; Grass Free Lawn by Lionel Smith, Olympic Park by Nigel Dunnett and James Hitchmough and “Pratensis” by Inger and Mats Runeson. We had the opportunity to meet J. Hitchmough, L. Smith and I. Runeson during workshops. Both Smith and Hitchmough gave lectures where we were able to understand



# INTRO- DUCTION



The diagram explains which method that is used to answer which research questions.

# INTRO- DUCTION

their projects. After the workshop we interviewed Hitchmough, Smith and Runeson to get additional information. We decided to do this via an unrehearsed conversation since it opens up space for free discussion. To get further information about the case studies we looked at related references, blogs, brushers and websites.

## *DESIGN*

The design part addresses the question: “What could an alternative sustainable lawn look like in the Swedish urban landscape and how can alternatives be communicated through a demonstration site in Ultuna Campus?” Since the demonstration trail was required by the research group to be placed at SLU campus, Ultuna we started by making an inventory of the conventional lawns existing at campus. We called the greenspace manager at SLU to access a map of the grassed areas at SLU. We combined this information with an map of “campus vision 2015” created by Akademiska Hus. After the overview of grassed areas at SLU we went to Uppsala to surveying conventional lawns in general urban situations. Analyses and observation resulted in suggesting lawn classification as a base for the trail design.

We know Ultuna Campus quite well since we both are students at SLU. We also visited the site several times during the project. To be able to propose sustainable alternatives to lawn we made analyses of the vegetation and habitats as well as climate conditions on the site. To place the trail in an interesting terrain we did a spatial and character inventory.

At the same time as we started the analysis of the area, the design of the trail started to develop from conceptual diagrams and sketches. We made series of sketches as a team work as well as individual exercise until we find a solution that was satisfying both of us. From the literature studies we gained important information on how to conduct the design process. We call this information design tools and design aim.

At the start of the design process we were thinking about plants more as spatial element. During the thesis we discussed the selection of plant materials together with the LAWN research group. We also chose plants with inspiration from case studies and other references. In the end of the thesis we developed a more detailed ecologically appropriate plant palette adapted to the different conditions at the site.

## *VISAULIZATION*

Visualization is divided into two parts; a paper format that includes the master plan, analyse maps and perspectives and a movie where the lawn trail is connected and compared to existing urban situations. The visualization is an important part of this project since one of the aims of our thesis is to inspire villa owners, designers and stakeholders to establish new sustainable alternatives to lawns. The perspectives are created with a mixed technique of aquarelle and collage in Photoshop. Since the demonstration trail is located at SLU we created a movie that can reach a broader audience. We started by writing a detailed manuscript to the movie and created all images that were necessary for the story about alternative lawns.

## *Limitations*

The thesis will investigate lawns in Sweden with some references to other countries. A large part of the thesis includes a design proposal for a demonstration site. Our intention is to propose a realistic design for the demonstration trail which has made us choose to not change existing structures on the site. Plant material in the proposal is adapted to the climate conditions in Uppsala. From requirements from the LAWN research group the demonstration trail should be placed somewhere at campus SLU, Ultuna. In the thesis we have chosen to only write about projects with a sustainable approach and worked toward sustainable alternative solutions in the design proposal. The design proposal is a conceptual and inspirational work with plant materials that are suited to different habitats on the site.

## *Audience*

This thesis is addressed to landscape architects, landscape architecture students, city planners and other stakeholders. The aim of the thesis is also to inspire and inform the public about sustainable alternatives to lawns. The design of the demonstration trail at campus Ultuna will work as a test site for the LAWN research group.

# INTRO- DUCTION

## *Definitions*

*Ecosystem services:* Ecosystem services include the services humans get from ecosystems and their organisms. The definition “ecosystem services” was recognized on a more common basis year 2001-2005 with the Millennium Ecosystem Assessment (MA). In this research we accepted four categories of ecosystem services: supporting, regulating, cultural and providing (Johan Colding 2013).

*Conventional Lawn or Lawn:* In the thesis we sometimes refer to the “conventional lawn” or just lawn. We use these two definitions for the most common lawn that can be found in urban areas. A conventional lawn or a lawn consists of a few grass species and is due to frequent cutting by lawn mower no higher than 10 cm.

*Alternative Lawn:* Vegetation that can replace the lawn in urban situations is in this thesis refer as alternative lawns. Alternatives lawns contain a higher biodiversity than the conventional lawn and have a historical, aesthetical or functional connection to the conventional lawn.

*LITERATURE  
STUDIES*



# LITERATURE STUDIES

## *What is a lawn from ecological and social point of view and how has the lawn been used in Swedish landscape design through the history?*

*To understand the lawn from a cultural point of view a historical review has been created to investigate where the phenomenon lawn comes from and what roles it has played in mankind's landscapes over time.*

*The review investigates how the lawn has been used in landscape design history and how it has influenced the Swedish urban landscape. The chapter concludes with a discussion about what the essence of a lawn is and how its cultural meaning could be addressed when proposing alternative lawns.*

### *Grass and original grasslands*

The lawn as phenomena has a long history in landscape design but the appearance and signification has changed over time. A globalization of western landscape design ideals with origins in France, Italy and England have made the lawn a “natural” part of most urban green spaces in Sweden and all over the world. Ignatieva<sup>1</sup> means that even though the lawn is a very common feature in our urban landscapes the green and lush lawn of our time cannot be seen as a natural ecosystem neither in Sweden nor in most other parts of the world.

Natural grassland only occurs on the North American Prairie, the Eurasian steppes, the South American Pampas, the African savannah, the New Zealand Tussock grasslands and at flood plain meadows in Euroasia (Ignatieva 2013). It is difficult to know which grasslands on earth occur naturally and which have been impacted by human activities. Early humans used fire to create open fields, which benefitted the grasses as their underground parts remain vital after burning. Most likely the grasslands spread across the globe together with human exploration. Grasslands have played a crucial role in the development of human society. Humans have often built their settlements close to grasslands and they used these areas for hunting, grazing and growing crops. A large amount of the world's food resource comes from domesticated grasses such as rice, rye, oats, wheat, corn and sugarcane (Nordström 1990). There is the research that suggests the preferences mankind has for grassed landscape could be inherited from the times when we lived near natural grasslands like the steppes and savannahs (Bormann 1993).

The oldest kind of farmed land in Sweden is the leaf-meadows (Swedish: lövängar). These fenced and grazed meadows with trees created mash for the animals during the winter season. Historically, animals were more important than arable farming and the meadow was therefore an important part of the Swedish people's everyday life (Jakobsson 2013). In most parts of Europe, large areas of forest have since long been burned or cut down to become grasslands for grazing. This implies Nordic meadows and European pastures have always been a cultural product that demands human attention or grazing to stay open (Nordström 1990).

### *The meadow as a decorative lawn*

During medieval times humans started to use meadows as decorative elements in gardens. Tufts of grass were collected from nature and planted in fenced gardens (Möller 1992). One theory of the origin of the word lawn is that it derives from the old English word ‘laund’ which means fenced or wild vegetation. Low cut meadows were probably also used during the 14th century when the game bowls became popular amongst the English upper class. The “bowling green” became a common feature in the estate gardens like Claremont Surrey in England (Möller 1992). In both Sweden and Europe medieval gardens were often connected to monasteries and are interpreted to have been an image of the Christian paradise. Swedish monastery gardens had different parts where one was the treegarden, “trädgården”, today's Swedish word for garden, which probably was a meadow with fruit trees (Jakobsson 2013). Many paintings from the 15th century depict the floor in Eden's paradise garden as a green carpet with flowers, similar to a meadow (Monique 1999).



*The paradise garden depicted with a green carpet full of flowers. Unknown German painter, 1415. Städelsches Kunstinstitut, Frankfurt. Ignatieva 2011.*

<sup>1</sup>Maria Ignatieva Professor, SLU department SOL, conversation 2013-10-14

## *Grass as a decorative element in the “French style”*

During the era of Gustav Vasa, the power of the Church in Sweden lessened and influences for garden design were instead taken from the general culture in Holland and Germany with inspiration from France and Italy (Jakobsson 2013). One of the reasons the lawn became such a common feature in western urban landscapes, including the Swedish one, was due to the globalization of landscape architecture styles and their plant materials. The formal French garden is one example of a “globalized” landscape ideal (Ignatieva 2012).

By the end of the 17th and beginning of the 18th century the style of formal French garden was spread through Europe and its new colonies. The formal French garden was associated with power and became popular amongst the nobility in Sweden during the period of Greatness (Olausson 2013). Low cut grass was here used as a decorative element in most parterres and bosquets of the French gardens. The grass was in both cases a decorative element and people were not allowed to trample it and walked on gravel paths around (Möller 1992). The French orna-



*Turf-lawn in a french parterre in Zwinger, Germany.  
Photo: Maria Ignatieva, 1979.*

mental gardens were often seen from the second floor of a house, where people could look down at the complicated geometrical patterns and “be impressed by humans control over nature” (Bormann 1993).

## *Grazed grassland in “English landscape parks”*

As a reaction to the formal French style, a more naturalistic style became popular in Europe during the second half of the 18th and early 19th century. This style is called the English landscape park style and has its roots in England. The designers of the landscape parks tried to imitate real nature with serpentine paths, open grasslands, groves and forests arranged to be beautiful as the scenery of a painting. Vast grass fields were often used to create an illusion that the property extended all the way into the surrounding nature (Bormann 1993). Low grass was an essential element of the open spaces in the landscape parks and flowers were used only if they grow naturally in woods or on meadows. The British climate was favourable for growing pastures and the parks were often simultaneously a productive landscape used for grazing. Grasses, native to Britain (and Europe) such as *Lolium perenne* (Engelskt rajgräs), *Poa pratensis* (Ängsgröe), *Festuca pratensis* (Ängssvingel), *F. rubra* (Rödsvingel), and *Arrhenatherum elatius* (Knylhavre) spread to the rest of the world together with the English landscape style (Ignatieva 2012).

The fashion of English park-style probably came to Sweden during the 1770’s. In Sweden the English style was often added to already existing structures which resulted in a hybrid style developed with meandering paths juxtaposed with avenues, meadows, bosquets and so on. One example of this is the Royal park of Drottningholm, in Stockholm (Olausson 2001). Later parks, like Hagaparken in Stockholm was designed as true English landscape parks and in Hagaparken Sweden’s most famous lawn, called Pelousen, can be found. Pelousen was designed as a big open grass field framed by trees and woods that later when the park opened for the public in the early 19th became a popular recreation place amongst Stockholm residents (Wikipedia 2013).

The introduction of the English landscape style coincided with the societal changes of industrialism and the development of a new wealthy social class (Olausson 2013). A toy-like scale of the landscape garden was also developed near estates of the nouveaux riches (Olausson 2001). As





*The Pelouse in Hagaparken, Stockholm.  
Photo: Mercury dog, 2012*

an effect the style came to be developed not only by landscape architects but also by artists, gardeners and estate owners themselves. Due to the amateur will to design and the reproduction of the English style through garden magazines, the ideals of the landscape style also spread to smaller towns in Sweden. Landscape parks were created with money from the local industry in for example in Baldersnäs in Dalsland (Olausson 2013).

In 1830 the lawn mower was presented in the *The Gardener's Magazine* in England. Until then, the lawn had demanded a lot of care and was there for a status symbol only a few people vouchsafed. With the introduction of the lawn mower the lawn spread to an even broader audience (Möller 1992). From that point on, the lawn was an essential element of public parks, becoming more and more used for recreation and as a display for other elements such as flowerbeds and exotic shrubs and trees (Ignatieva 2012).

### *Functional lawns for health and recreation*

Interest in gardening grew in Sweden during the early 19th's and gar-

den societies started to take initiatives to own park projects, like the still existing Garden Society's Park in Gothenburg (Waern 2013). During the second half of the 19th century most European cities underwent large changes and completely new city environments were created for "the modern life"; including public parks for citizens. The aim was now that the park should be a social arena with room for playgrounds and physical activity for the labourers (Henriksson 2013). Opposing earlier garden ideals that addressed people with higher garden knowledge, the public park was designed with rationality and simplicity. The park was often designed by the city gardener who picked up elements from former French and English styles with plant material from both native and exotic species. New geographical discoveries by the British Empire had introduced new plants to the market and the so called carpet beddings of colourful annuals became popular and were planted as beds in the lawns (Ignatieva 2012). The earlier mentioned Garden Society's Park in Gothenburg is one of the parks that followed this European gardenesque trend and the carpet beddings provide one of the main attractions (Trädgårds föreningen 2013).

With the dispersion of the modernist style, the parks became a part of the city structure (Andersson 2013). Modernism and also the architectural style of functionalism had its breakthrough in Sweden after *Stockholmsutställningen* (exhibition in Stockholm) 1930. Functionalism advocated an aesthetic based on functional analysis where "the effectiveness also was the beautiful" (Wikipedia 2013). In city-planning, free lying houses was placed in park landscapes so the sun could reach into all apartments and the inhabitants had access to fresh air and park space (Wikipedia 2013). Inspired by functionalism, parks and gardens were now designed to improve people's health and to be a kind of "living room for outdoor activities" (Andersson 2013). Amongst others, le Corbusier designed functional buildings with lawns extending all the way up to the house, aimed for an active outdoor life (Möller 1992). A special kind of park politics was developed in Stockholm during the 1940's where the parks were seen as a social right for the citizens. The so called "Stockholm style" (*Stockholmsstilen*) gave the bourgeois parks a new functional and cultural content (Wikipedia 2013).

# LITERATURE STUDIES



*Functionalistic buildings in a park in Kortedala in Gothenbourg  
Photo: Eva Ekeblad, 2008. www.flickr.com*

## *Standardized landscapes and lawns as urban floors*

The large Swedish house estate project called the “million-program” was developed during 1966-1975. The program aimed to produce 100 000 households per year. This project impacted heavily on Swedish landscape architecture. Compressed schedules, tight economy and modernistic aesthetics gave simple designs. Fast growing trees, sections of bushes and vast lawns in functionalist spirit gave simple, standardized landscapes that should be easy to maintain. However the Million-program era was followed by a period of environmental rehabilitation where courtyards were supplemented with more ‘naturalistic plantings’ (Andersson 2013).

In the 1970s, many of the functions that had been designed for parks moved inside and became institutionalized. As an effect, parks became abandoned and perceived as an unsafe place to be. Even during the late

modernist times the tendency to program all surfaces in the landscape design has lived on. As the interest for the urban life was grown, the park became strongly urban and during post-modernistic times parks were designed more as architectural built environments rather than nature. Examples of this are for example Parc de la Villette in Paris, Fatbusparken in Stockholm and Baltiska entrén in Pildamsparken in Malmö (Andersson 2013).

The lawn has become an essential part of human activity in urban areas. Every green space has its prerequisites and by grass breeding, horticulturists are trying to find grasses for different kinds of lawns. There are many wild grass species living in Scandinavia, but only a few of these are used in today’s Swedish lawns resulting in low biodiversity. The grass breeding started with forage grasses aimed to provide a great harvest and therefore grow intensively. Since today’s grass mixtures for lawns still are dominated by forage grasses, perpetual cutting is required to keep a lawn low and dense (Persson & Wallin 1991). Today’s ‘garden maintenance’ often simply means ‘lawn maintenance’ (Möller 1992) and Eriksson1 be-



*decorative lawn in Baltiska entrén in Pildamsparken, Malmö.  
Photo: Ameli Hellner, 2010.*



believes that for many private house owners the lawn is more a question of conscience.

As an effect of globalization on European landscape architecture styles, and in addition the lawns, many of our urban landscapes look the same worldwide. This can be seen as a problem though standardization of plant material, as in the example of lawn species, is a threat to urban biodiversity. One could also argue that the dispersion of the same ideals has led to a kind of placeless design that are homogenizing our urban landscapes and are causing problems of identity in many parts of the world (Ignatieva 2012).

### *Concluding reflection*

In English the word lawn derives from a word for a meadow while in Swedish the word possible comes from the fact that it was used as a carpet, as the word gräsmatta indicates. The phenomenological difference between a meadow and a lawn might have appeared during the medieval time due to the shift of purpose of the meadow from being functional to being purely decorative. Meadows then became connected to practical use like arable farming, haymaking, building roofs etc while the lawn was connected to leisure and social values and placed associated with people's houses.

Lawns has changed in appearance throughout history but always been a symbol for the art of controlling nature in some way. The lawn as a kind of urbanized nature, that we see in our postmodern urban environments today (like Baltiska entrén) is similar to the ornamental lawns in the French gardens like Versailles. Both are a kind of geometric architectural art where the lawn is a decorative element that is used precisely for its colour and texture.

The lawn is very much like a carpet in an outdoor living room that in the Postmodern and French is more decorative than the English and Functionalist styles in which both are decorative and functional. The vast lawns in the English landscape parks were also an extension of privately owned property into the surrounding landscape. Parks created in this style become highly used for recreation when they become public. Lawns in functionalist style also extend all the way up to the house and are designed to be the floor for everyday outdoor-life. One could argue

that due to the dispersion of Functionalism which placed health in focus, the lawn was also a symbol for health and recreation. In addition many sports such as tennis, rugby and football has throughout history have been using the lawn as a ground cover. The lawn in English park style is also associated with nature (even though they are still artificially created like French style) because they are used in a context which is supposed to be perceived as a "natural landscape".

The relationship between humans and grassed landscape has a long history, where it has been used for food, medicine, decorative reasons, and to provide social values. Bormann (1993) talks about a possible preference for grassed landscapes since the time we lived on savannahs. A flat landscape provides good sight which also creates a kind of security for people. Today people are no longer living under the threat of being attacked by animals, however urban habitats hold other dangers that create the need for a kind of "secure" landscape where people have overview and therefore feel safe.

The introduction of lawn mowers and the mass production of green spaces with lawns during the million-program era have contributed to making the lawn a standard. People today and during the last decades are affected by the way lawn is portrayed in media, as it is a commercial product and a lucrative industry. Since the grass-mixes one buy today still are forage grasses it means you also have to buy a lawnmower and in warm and dry parts of the world the grass mixes also need fertilizers and herbicides to establish. As Ignatieva (2012) points out there is little difference in the way lawns look all over the world even though we have very different climates and soils.

It is interesting to see how the purposes of lawns have changed throughout history. As landscape architects we could use this information to create "carpets" with reasonable motives in landscape design. Just a second thought of what the reason behind having a lawn at a specific site might be, changes the design in many cases and forces us to question. Another design solution could also create new values where the conventional lawn does not have a value or have lost its purpose. The fact that Swedes have a strong historical relation to the meadows is interesting. Taken in the context of contemporary urban environments it might suggest a kind of cultural acceptance of a change towards grassed landscapes that look more like meadows.

<sup>1</sup>Tuula Eriksson, Lecturer, SLU department SOL, conversation 2013-10-14

# LITERATURE STUDIES

## *What advantages and disadvantages are there with a lawn and how can designers develop the lawn through ecosystem services thinking?*

*In the search for sustainable design solutions for Swedish lawns, this chapter addresses issues concerning the conventional lawn. To define “sustainability” this chapter includes the concept of ecosystem services, which will be discussed in relation to the sustainability of lawns. Ecosystem services will also be used as a tool in the design process to find alternative solutions to the conventional lawn. This chapter will discuss what consequences lawn has on maintenance and what that has for direct effect on ecological sustainability. In conclusion, various aspects brought up in the text will be discussed to give an idea of what a more sustainable lawn could look like in the Swedish urban landscape.*

### *Ecosystem services - a way to define sustainability*

In the debate of sustainable urban planning the concept of ecosystem services is used to combine different perspectives of sustainability like ecology, economy and social issues. Ecosystem services make it possible to economically and socially evaluate products and benefits humans gain from nature like pollination of plants, clean water and air, temperature regulation, better health and so on. Instead of using biological diversity as a way to measure sustainability, where diversity is valued on its own, ecosystem services are directly connected to the services humans receive from nature and are therefore a stronger concept to use in urban planning that involves humans and nature in coexistence. Ecosystem services are well discussed in scientific contexts and in Stockholm the Stockholm Resilience Center is involved in incorporating the concept into city planning (Colding 2013). Examples of important ecosystem services in urban areas are air filtration, rainwater drainage, micro-climate regulation, noise reduction, sewage treatment and cultural and recreational values (Bolund & Hunhammar 1999).

Ecosystem services became a well-known concept due to Kofi Annan’s initiative of the Millennium Ecosystem Assessment (MA) in the year of 2001 where over 1000 scientists investigated the world’s ecosystems and the services they provided (Jutila et al. 2012). MA divided ecosystem services into four different categories; provisioning services, which includes materials (animal and plant fibres), water and nature medication, regulating services such as cleaning of water, pollination and carbon sequestration, cultural services as health, recreation and aesthetic values and finally supporting services that include biodiversity, soil formations and photosynthesis (MA Board 2005). Since humanity can be seen as part of nature, cities themselves can be viewed as an ecosystem (Bolund & Hunhammar 1999). Bolund & Hunhammar have identified seven different urban ecosystems that contribute ecosystem services, with lawns and parks as one of them. The seven urban ecosystems are; street trees, lawns/parks, urban forests, cultivated land, wetlands, lakes/sea, and streams (Bolund et al. 1999).

One way of seeing the economic value of an ecosystem services is for

example to let humans take over the work nature conducts for free. One can then evaluate the cost of letting humans pollinate plants or the cost it takes to build water treatment plants (Colding 2013).

Cleaning of water is an ecosystem service that is important in urban areas where there is polluted runoff from industries and from agricultural fields (MA Board 2005). In urban areas rain-water often falls onto hard surfaces, such as roofs, squares and pavements where it cannot filtrate through the ground. Today it is common to lead run-off into wells where it ends up in lakes, sea and rivers. It is therefore better to take care of the water on site and plan for vegetation that can filtrate water and extract pollution (Bolund et al. 1999).

Another central ecosystem service for human wellbeing in urban areas is noise reduction. With the growing demand for land in the larger towns in Sweden it is difficult to create distances between noisy roads and public places. Here a lawn can absorb noise and decrease the sound by 3dB in comparable to a hard surface (Bolund et al. 1999).

Ecosystems also regulate the climate both locally and globally. Since 1750 the carbon dioxide in the atmosphere has increased by 32% and the global temperature is rising. A temperature change on earth is devastating to many species. Greenery, in comparison to hard surfaces, has a cooling effect on the micro-climate in urban areas by photosynthesis reducing greenhouse gases (MA Board 2005).

For ecosystems to function and for humans to be able to benefit from a high variety of services, biodiversity is of great importance. In the past hundred years humans have increased the species extinction rate by 1000 times. The earth is getting more and more homogeneous which means the species in one region is becoming more similar to the set in another region (MA Board 2005) The globalisation of the conventional lawn contributes to this homogeneity of plant species and is a threat to urban biodiversity (Ignatieva 2011). As all species are dependent on each other in a habitat with a low amount of biodiversity it is sensitive and can easily be damaged if one biotope gets out of balance. A more diverse habitat has a stronger ability to handle disturbance such as climate changes and pollution (Stockholm Resilience Center 2010) and an area with a high variety of biotopes has therefore higher resilience and can function as a biodiverse buffer inside and outside of urban areas (Bolund et al. 1999).

Since the conventional lawn is homogenous in composition it does not provide a variety of plants that benefit pollinators. Pollinators are important since 35% of global food production is dependent on animal pollination (Klein et al. 2007). Especially bumble bees are important for pollination of plants and have during the last years decreased dramatically in numbers. To survive and reproduce bumble bees are dependent on areas that provide nectar and pollen within flying distance (Goulson 2003).

## *How maintenance affects the appearance and biodiversity of lawns*

Biodiversity and the aesthetic appearance of lawns in urban areas are highly connected to how the site is maintained. A low cut lawn that is frequently maintained contains less species than a lawn that is less maintained (Bergström et al. 2012). This is also confirmed by the results from a pilot study conducted by the LAWN research group<sup>1</sup>. Grass surfaces in the centre of cities are often highly maintained and a higher biodiversity is therefore often found in the outskirts of cities (Bergström et al. 2012). To improve biodiversity inside urban areas one can control how often lawns are cut, choose to cut after the flowering period or in some cases even forbid a certain type of maintenance completely (Bergström et al. 2012).

The species richness of a site is dependent on disturbance and stress. Disturbance is for example grass cutting, human activity, grazing or fires. Disturbance is defined by changing the conditions for competition between different species and the type and frequency of disturbance affects the variety of species. Stress on the other hand is caused when a site has an unbalance of one, or more, of the abiotic factors, such as water, nutrients, light or pH. When the ground is disturbed and under stress, plants that are less competitive but manage disturbance well can establish faster. Smaller and “weaker” plants then reach the sunlight and have more nutrients left than the larger plants which have their vegetative body removed. With a combination of disturbance and stress rich biodiversity can occur. Meadows are an example of a site that contains both rich flora and fauna due to regulated disturbance such as haymaking and stress caused by lacking nutrients (Ekstam, Urban, Forshed 1992).

<sup>1</sup>Meeting with the lawn research group at SLU 21 okt 2013

<sup>2</sup>Per Westerlund conversation during meeting with the lawn research group at SLU, 21 October 2013



*Meadow in urban siltation. Photo I. Runesson. 2012*

To replace lawns with meadows in urban areas is one method of restoring an ecosystem. If the meadow is constructed correctly the meadow like ecosystem can work as a biodiverse alternative as well as decrease the maintenance costs for municipalities (Bergström et al. 2012).

According to Westerlund<sup>2</sup> Contemporary management of Uppsalas urban green spaces are often conducted in accordance to a standard management-manual called Skötselplan 98 Here the most common green elements are brought up together with standards for how they should be maintained. Lawns are here divided into four categories; prydnadsgräsmatta (ornamental lawn), bruksgräsmatta (functional lawn), högvuxen gräsyta (high grassed area) and äng (meadow). The ornamental lawn is most frequently maintained, then the functional lawn after that the high grassed area and the least cut is the meadow (Persson 1998). Westerlund<sup>2</sup> means that lawns in urban situations are often seen as functional lawns, meaning they are frequently cut. The high maintenance is not only an environmental issue but is also economically costly. For example, the Uppsala municipality are spending around 15 million SEK of the 40 million SEK year-budget for park management on maintaining lawns. In Uppsala, pesticides are not used for lawns anymore and Westerlund<sup>1</sup> is positive to alternative solutions that might decrease maintenance costs and benefit



biodiversity. For this to happen, Westerlund<sup>2</sup> sees a need for a change of attitudes amongst both politicians and the public in general. According to Westerlund<sup>1</sup> people value shortcut grass for its social values and as soon as an area is not cut low, people call the municipality with complaints.

## *Perceptions and associations of lawns and wilder vegetation*

*"In the dream the lawn in your garden is emerald green, dense and well maintained with straight edges. It is the space where you meet with friends for cocktails or outdoor parties, there is room for both croquet games, frisbee throwing and relaxed contemplation to the sound of hops buzzing and chirping of birds" (Kaasik 2013).*

Results from an American research by Nassauers (1997) show that even though people have different knowledge about sustainability and different aesthetic preferences people's lawns often look the same (Nassauer 1997). This is similar in Sweden means Eriksson<sup>1</sup> since Swedish people in multifamily households and in villas find it important to keep the lawn well cut. Eriksson sees that it is a general view of the lawn in our society that leads us to believe that there is something "wrong" with the people in the house if they don't cut their lawn frequently. It is so abnormal to not mow your lawn that you put yourself at social risk where you can get in to conflict with your neighbours regarding this issue (Nassauer 1997). The association between a well-maintained lawn and a well-maintained family is also depicted in media which in critical context makes the lawn a symbol for both the "suburban ideal" and "it's latent nightmare" can be interpreted in the beginning of the film *Blue velvet* by David Lynch (Wigley 1999). Private households in Sweden also see the well cut lawn as a status symbol that has an importance for the economic value of the house. Though the lawn-mowing in general often is a leisure activity amongst men, the perfect lawn is also in some ways associated with good technical skills and masculinity (Möller 1992). According to Smith<sup>2</sup> people's approach to their private lawn seems to change during different stages of their life. The lawn is often a central part for recreation and play



*Private gardens at Ekerö, Stockholm.  
Photo: Ulf Grunbaum, 2013.*

but when the kids have grown up many people do not see the same value in their lawn anymore. Older people then start looking for alternatives that are more decorative and require less maintenance. Dunett and Hichmough (2004) suggest that aesthetic preferences can change through experience and learning. Landscape architecture students are an example of this as they often appreciate other things in an urban environment at the end of their studies in comparison to the beginning. By this they suggest that people might be able to learn to appreciate multiple aesthetics in their urban environment that is less neat and more "natural" (Dunett & Hichmough 2004). Ercoskun (2012) suggests that there are two different kinds of relationships between humans and nature. The first one is a peaceful "mother like" relationship where humans understand and value the goods nature brings. In the other kind of relationship the humans see nature as an enemy that needs to be controlled and defeated. These two different views have evolved and played an important role in the design of our urban areas today. During decades humans have been controlling and by design keeping the "wild nature" outside the borders of the cities (Ercoskun 2012). People seem to like "natural scenes" in rural contexts

<sup>1</sup>Tuula Eriksson, lecture SLU department SOL conversation 21 October 2013

<sup>2</sup>Lionel Smith, Phd Student, University of Reading lecture at SLU 14 October

but less in urban ones, as this is often seen as undesigned wild nature that nobody cares for. The scene of vegetation in an urban context needs to be ordered in some way to guide the viewer to the design (Dunett et al. 2004).

Throughout the history some landscape features has become such common features that they are not questioned from an ecological point of view. People often automatically connect aesthetically appealing landscapes with ecological sustainability. The English landscape style is often seen as ecologically healthy environment since people found it aesthetically appealing even though this landscape is highly modified and in most cases artificial created. Typical is that even though nature in itself is always changing, nature in landscape design is often designed to stay static (Nassauer 1997). Westerlund<sup>1</sup>, at the municipality of Uppsala suggests that people want to protect nature they find aesthetically appealing. People see little value in green areas even though it is rich of species if it looks “messy”. He also believes that areas that are non-aesthetically appealing are at great risk for future housing development. To protect



*Do you have a crappy meadow like this lying around? Advertisement from BoKlok, IKEA in DN 18 november 2013 for house development, shows what people tend to think about uncontrolled vegetation. Photo: Ameli Hellner, 2013.*

nature in urban areas, he believes it is important they fulfil some kind of social purpose, for example being recreational, educational or aesthetically appealing.

According to Robbins (2007), highly educated people with a high income, cut and fertilize their lawns most frequently. A result that is counteractive to other research results that show that it is the highest educated people that are most aware about their environmental impact on the earth. One explanation for this, he suggests, is that there is a lot of information of global environmental issues but there is a lack of specific knowledge on our everyday landscape. People don't seem able to understand their environmental impacts if the consequences of their actions are not visible to them (Robbins 2007).

### *Designing for a biological diverse environment*

Different designers are promoting a “nature-like design” as a way to create more biologically diverse environments. Dunett and Hichmough (2004) discuss different methods of creating “ecological nature like plantings”. One way is “habitat restoration” which refers to the recreation of historical landscapes by guessing what species lived in the area before and trying to find local seeds and restoring the historical landscape based on native species. Another approach is the “creative conservation” style where one aims to find plants that are ecologically fitted to the place they grow. Native species are then often used that fit to the environmental condition and plants will function as plant communities instead of as individual species. The third stand within the nature-like planting is the “anthropogenic landscape approach”. This viewpoint allows the creation of nature-like communities of species that would not naturally exist in this condition. The approach creates new plant communities that are fitted to the specific site condition but with a composition that cannot be found in any “natural” flora. This style is strongly driven by aesthetic concerns. In common of all these three styles is the species specific fitness to the site condition contributes to a low-intensity management and a natural selection where some plants will disappear in favour for others over time (Dunett et al. 2004).

Hammer (1997) writes in the article *Naturen som trädgård*, (in English: nature as a model) that for nature-like plantings one needs ecological

<sup>1</sup>Per Westerlund, Green space manager of Uppsala. Conversation during meeting with the lawn research group at SLU, 21 October 2013



thinking. For ecological design and management he presents three basic principles. Firstly, a plant community is part of a whole ecosystem which means that changes in the system have effects on the whole community of flora and fauna. The second principle is that each species is fitted to certain environments. The competition between plants in nature is high and what plants demand of their environment is specific and important for their survival. Knowledge of the plants demands on soil and climate is therefore very important. The third basic principle Hammer brings up is that all plant communities are dynamic which means that plants die and are replaced by others. To be able to create a well-functioning naturalistic planting there needs to be room and acceptance for changes in the planting. This is in opposition to traditional maintenance that aims to keep the vegetation static. It is important to find the right maintenance strategy for a site. If the maintenance would cease, plantations will in most cases in Sweden develop to some kind of forest (Hammer 1997).

The discussion about native or non-native plants is frequent in the concept of ecological planting design. Dunett & Hichmough (2004) argue that some countries might have a small native fauna that raise an interest for non-native plants that could contribute to other visual and functional characteristics the native flora cannot promote. Another pragmatic reason would be that it is difficult to locate local populations to be used as seed sources as the genes of common native species often change over time. Genuinely local mixes might be better adapted to the urban climate that has other soil conditions and climates. In the biodiversity debate non-native species are sometimes claimed to be poorly fitted or invasive. One could argue that there are also other species that are perfectly robust without being invasive (Dunett et al. 2004). However, continuous inflows of foreign genes are also seen to risk a weakening of native species though they might lose their adaptability when conditions are changed (Gustavsson & Ingelög 1994).

### *Concluding reflection*

Ecosystem services are a relatively new tool for measuring sustainability in urban areas. One argument for using ecosystem services as a tool of measuring sustainability is that areas that are “too wild” for people in general to appreciate are at great risk for future housing development. To

protect nature in urban areas it is important that the areas fulfil some kind of purpose. To use ecosystem services as an argument can be powerful in sustainable development questions as it works as an economic, social and ecological tool. Current decreases in ecosystem services are a tremendous cost for society and it is therefore of value from an economical point of view to create alternatives to homogeneous urban greenery like the conventional lawn. Though the information about ecosystem services is mostly about greenery in general, it is difficult to evaluate lawns separately. And when lawns are brought up from a sustainability point of view it is compared with a paved ground cover and therefore often seen as an ecological good option. To instead compare the lawn with what services a natural green area is providing the lawn can be developed.

However, conventional lawns are highly connected to the cultural ecosystem services as they are well used for their recreational values such as sport and social meetings. It is most likely the social values people find in the conventional lawn has created this popularity. In the search for an alternative lawn it is important to understand and ensure these values are not lost. In urban areas today there are large areas of lawn that do not have a specific recreational purpose as for example road verges, fields in the outskirts of the city, left over spaces and so on. These areas that are not providing social ecosystem services have potential in becoming places that can provide other types of ecosystem services such as, new aesthetic values, other recreational possibilities, pollination, biodiversity, cleaning of soil, air and water and so on. If we see the whole city as an ecosystem we can make sure that the green spaces in that system provide a mix of different ecosystem services. Since 70 percent of the open public space in Sweden contains conventional lawn and this lawn mostly provides recreational services, alternatives that provide other types of ecosystem services have strong reasons to be considered.

When it comes to proposing alternatives, maintenance becomes an important factor in the design of green spaces in an ecological way that is benefitting biodiversity. It is a key factor in the development towards a kind of dynamic and ecological view of the green spaces. At the management department in Uppsala municipality one already sees value in finding an alternative maintenance plan that has other objectives than the existing Skötselplan 98. Per Westerlund<sup>1</sup> discusses the possibility of hav-



# LITERATURE STUDIES



*Example of lawn in urban area that is not used for social activities. Uppsala. Photo: Julia Vilkénas 2013.*



*In some areas the lawn is used for social activities and sport, these possibilities are important to have in an urban area. Uppsala. Photo: Julia Vilkénas 2011*

ing a park management sector with a similar approach to maintenance as a nature conservation department, with long term objectives and budgets that extend over several years. This might also change what we see on the floor of our urban environments. Even though a conventional lawn is not expensive to establish it is expensive to maintain. A high percentage of the municipality's budget for green spaces goes to maintenance of lawns. Even if an alternative has a higher cost in the establishment-phase it might be evened out over the years if the alternative is maintained less often. Bergström et al. (2012) propose that maintenance should be regulated or even forbidden in some areas of the city to reach a higher biodiversity. This approach is very interesting but the sensibility towards too wild and nature-like vegetation that has been discussed by both Ercoskun (2012), Westerlund and Dunett & Hichmough (2004) should be considered. As Ercoskun (2012) mentions, humans have historically kept wild nature outside the city border and modified nature inside to look neat and clean. As Hitchmough, et al. (2004) Eroskun (2012) and Nausser (1997) discuss it is difficult for people to relate and accept "wilder" nature in urban areas. Therefore it is important for designers to be creative and to find solutions that contain high biodiversity without looking too wild or "messy". Robnsson (2007) suggests in America, a messy lawn might suggest that something is messy with the family that lives in the house and according to the pilot-study by the LAWN research group similar associations can be observed in Sweden. This is a big issue while striving to implement ecological sustainable alternative lawns in private gardens. Therefore it is of value to demonstrate and inform about different ecological friendly alternatives to the conventional lawn that can be both sustainable and aesthetically appealing.

Today aesthetically appealing landscapes are not always the same thing as environmental sustainable landscapes. It is important that this view of environmentally friendly landscapes is changed as nature is non-orderly in itself. Perhaps through history it has been beneficial for human survival to be able to control nature, to keep wild animals and to have an overview over the environment. But today we are facing another dilemma where ecosystem services are decreasing and humans' survival depends on whether we are going to let nature be part of the human existence.

<sup>1</sup>Per Westerlund conversation during meeting with the lawn research group at SLU, 21 October 2013

# *CASE STUDIES*



# CASE STUDIES

## *\_Olympic Park \_Avondale Park \_Native meadows by Pratensis*

*To give examples of design-alternatives to lawns this chapter will look at three different projects about sustainable plantings. The first case study is Olympic park, which was developed for the Olympic Games in London. The second case study is a research about how to create lawns without grasses. The third case study is an example of different Swedish meadows in urban context created by the collection of seeds from native species.*

### *The Olympic park, London*

The Olympic park, now renamed the Queen Elisabeth Park was built for the Olympic Games in London 2012. It is the largest public park to be made in UK for the past 150 years and covers 150 ha (Topos, 2013). The 2012 Olympic Games in London aimed to be the first sustainable Olympic Games ever with the lowest ecological footprint possible. The area for the Olympic Park was previously a polluted industrial site and waste land (CNN 2012).

“We only have one planet; London 2012 will respect its ecological limits, its cultural diversity and create a legacy for sport, the environment and the local and global community” (BioRegional & WWF 2012)

The master plan of the Olympic park was developed by the company Hargreaves Associates and LDA Design in collaboration with the landscape architects James Hitchmough and Nigel Dunnett from the University of Sheffield. Hitchmough together with Dunnett developed planting concepts for the vegetation in the park.

To reach the goal of the most sustainable Olympic Games the plantations were required to be cost effective, simple to maintain, require little water and other resources and to contain high biodiversity. The different plantations in the park were based upon different biotopes such as meadow, woodland and wetland. The former conventional lawns on the site were transformed to “flowering lawns”(Topos 2013).

The plantations in the Olympic Park are designed to be what Dunett and Hichmough refer to as “naturalistic plantations”. Naturalistic plantations in comparison to conventional plantation do not consist of a certain pattern or direction. A naturalistic plantation is more an imitation of how plants grow in nature. To aim for sustainability it is of importance that the selected plants are well suitable for the habitat they are put into. With well adapted plants that establish quick there will be less or no need of watering, fertilizing and weeding. A naturalistic plantation consists of a high density of plants that contribute to a quick establishment, from 10plants/m<sup>2</sup> up to 100plants/m<sup>2</sup> (Dunett 2004). The plantations of the Olympic Park had three different themes, the South African Drakensberg meadow Garden, the North American Prairie Garden and



*Naturalistic plantation from the North American Prairie in the Olympic Park, London.  
Photo: James Hitchmough, 2012.*



*The colours of the exotic flowers in the South African Drakensberg meadow garden are popular among the visitors. Photo: James Hitchmough, 2012.*



# CASE STUDIES

the Olympic Park Native Wildflower Gardens.

The South African Drakensberg meadow Garden was planted in May-June 2011. This part of the Park consists of many different exotic species, for example a repeated pattern of the South African grass *Themeda triandra* (Kängurugräs) and *Carex teastacea* (Prairy Fire) from New Zealand. People found the South African meadow very appealing due to the spectacular flowers (Hitchmough 2013).

The plants in the North American Prairie Garden originate from dry to semi-moist prairies. Example of flowers that grow here are *Echinacea paradoxa* (Gul läkerudbeckia), *Penstemon barbatus* (Skäggört), *Eryngium yuccifolium* (Skallerorm matron) and andropogon grasses. Around the plantations there are bands of box hedging that creates a frame.

The Olympic Park Native Wildflower Gardens consists of native plants with low amounts of grass species. The plantation was sown in January 2011. The meadow is the main landscape element in the park and the plants were timed to be in the most flowering period during the Olympic Games. The Native Wildflower Garden is located on well drained ground and the soil is low on nutrient (Hitchmough 2013).

Hitchmough and Dunnett chose to use native and exotic plants in their plantations, insisting that whether flora is native or not is less important when it comes to sustainability as long as insects keep visiting and the concurrence between species is in balance. The most important in a naturalistic plantation is that the plants are well adapted to the habitat they are placed in (Dunett & Nigel 2004).

Hitchmough<sup>1</sup> commented that biodiversity is something that humans can construct and the constructed habitats do not need to be any less good or real than the natural. It is clear that humans are attracted to colourful flowers as in the South African garden, in this why it is possible to combine biodiversity with human's requirements.



The Native Wildflower Garden under construction in January 2011.  
The top soil is removed and the plants are seeded.  
Photo: James Hitchmough, 2011



A naturalistic plantation of native UK species in the Olympic Park Native Wildflower Gardens.  
Photo: James Hitchmough, 2011

<sup>1</sup>Dr. James Hitchmough, Landscape Architect, University of reading lecture at SLU14 October



# CASE STUDIES

## *Grass Free Lawn in Avondale Park, London*

Lion Smith<sup>1</sup> is during year 2011 to 2014 doing a PhD research at the University of Reading in UK on grass free lawns. Grass free lawns contain a high amount of species excluding grass. As part of the research a 200m<sup>2</sup> grass free lawn was established in 2012 in Avondale Park, Notting Hill. Smith first had the idea of a grass free lawn one warm summer when he was young and observed how the grass in his parents lawn had dried out and appealing wildflowers where flowering instead.

Smith's goal is to create an interactive, beautiful and pollinator-friendly lawn. Examples of species that a grass free lawn can contains are *Bellis perennis* (Tusensköna), red-flowering Trifolium (Klöver), Thymus (Timjan), *Matricaria recutita* (Kamomill), *Mentha* (Mynta), *Mentha requienii* (Korsikansk mynta), *Achillea millefolium* (röllika) and *Potentilla anserina* (Gåsört) (BBC 2013).

Grasses are highly competitive since they regrow quickly after mowing and take nutrients and light from less fast growing plants. By excluding grass totally in the plantation less competitive plants have a chance to establish and the lawn can form a high variation of species. In the grass free lawn species that are included in the group "clonal perennial forbs" are used. Clonal perennial forbs are plants that spread with runners over or under the soil, that survive more than two years and that are soft stemmed (Smith 2013). To make sure that the lawn will contain living species even when the climate conditions are changing Smith used plants with different abiotic requirements. Since different plants thrive differently according to climate and season the aesthetical expression of the lawn is dynamic (Smith 2013).

Smith<sup>1</sup> explains that the grass free lawn in Avondale Park was constructed by plants that were growing on trays, plug plants. The prepared plants were established directly onto a wildflower meadow which resulted in a lot of weeding. Another option could have been to first remove the top soil and maybe by doing that prevent some of the maintains cost.

Smith's<sup>1</sup> research indicates that the grass free lawn can produce up to 90% more flowers and contain over 25% more insects than the traditional lawn. With a high diversity of plants with more flowers insects are attracted to the grass free lawn in a higher degree than to a conventional lawn. It is important to find design solutions that combine biodiversity



*A close up picture of a grass free lawn with *Bellis perennis* and *Ranunculus acris*.  
Photo: Lionel Smith*



*A test site of the grass free lawn where the plants has been pre grown on trails.  
Photo: Lionel Smith, 2012.*

<sup>1</sup>Lionel Smith PhD student – University of Reading, lecture 14 November 2014



# CASE STUDIES

with beauty.

The mowing of a grass free lawn is done 3-9 times a year, which is 75% less than a conventional grass lawn, mowing is an important part of the aesthetically expression and to prevent taller species becoming dominant. To keep the right balance between disturbance and stress it is good to mow the lawn when it reaches a height of 9cm. When the lawn is cut the tall growing species lose a larger part of their vegetative body which makes their recovery time longer than short plants that lose less of their vegetative body. During recovery time the small plants benefit from sun light. If the lawn is not mowed it will become more meadow like where taller species will cover and shadow the shorter ones that will finally die and disappear (Smith 2013).

Smith<sup>1</sup> claims it is better to not fertilize the “grass free” lawn as competitively strong species will benefit from additional nutrients. As well as mowing, it is important that people walk on the lawn as it encourages lateral growth. However, if there is too much wear on the lawn it can on the other hand damage the plants.

Children find the lawn appealing, as it is full with four-leaf clovers, different textures, colours and smells to discover.

In the beginning of the research Smith<sup>1</sup> made compositions of the grass free lawn with native green plants. He received negative critique from other gardeners that found it “aesthetically unpleasant” and weed-like. Therefore Smith planted species at Avondale Park that contained more flowers and had an unusual expression such as red clover instead of white clover. This type of lawn was well received among the same group of gardeners as well as other visitors. Smith concluded that a grass free lawn is more appreciated with a larger number of flowers and leaf colour.

It is important to remember when creating alternative exemplar lawns; people’s vision of a lawn most often is a green monoculture. Through the example in Avondale Park and Smiths website about grass free lawns he has over four hundred requirements of private gardeners that want to have their own grass free lawn.



*The grass free lawn in Avondale Park, just before mowing.  
Photo: Lionel Smith, 2013.*



*The grass free lawn has a high biodiversity with plants in different colours and texture.  
Photo: Lionel Smith, 2012.*

<sup>1</sup>Lionel Smith PhD student – University of Reading, lecture 14 November 2014



# CASE STUDIES

## *Native Meadows, Pratenis, Sweden*

Pratenis is a company run by Inger Runeson and Mats Runeson at their homestead in Småland. For 20 years they have constructed and managed meadows with native Swedish forbs and grasses. They collect seeds from wild vegetation all around Sweden to recreate meadows for different climates. Many meadow species are becoming rare or endangered and reconstruction of meadows increase biodiversity of Swedish flora as well as the fauna that are dependent on meadow species (Pratenis 2013). Pratenis are breeding native flowers and grasses and selling them to private house owners, municipalities and companies. The seeds and plug plants have been used in many Swedish public parks such as Växsjö, Örebro, Laholm and Kristianstad, in the redesign of Berthåga cemetery in Uppsala and in roundabouts and road verges in Enköping and Vislanda (Pratenis 2013).

In Växsjö Pratenis together with the municipality created the Biparadiset (The Bee Paradise). The project started with an inventory of Bokhultets nature reserve in Växsjö where a high biodiversity of bees was discovered. The municipality decided to make a park of the area and used seeds and plants from Pratenis to create a special climate that is beneficial to butterflies and bees. The park, Biparadiset was created to increase the population of endangered insects and at the same time work as a park for people to visits. The park also works as a centre for information about bees and insects and how you can benefit their existence in your home environment. In Biparadiset meadow landscapes, hillside landscapes and sand landscapes are created to specially benefit wild bees. The meadow is rich in flowers and includes *Knautia* (åkervädd), *Campanula* (blåkllockor), *Crepis* (fibblor) och *Trifolium* (klöver). The hillside consists of poor soil with plants as *Calluna* (ljung), *Solidago* (gullris) och *Arnica montana* (slättergubbe). The sandy landscape is a remnant from a former gravel industry that was located on the site and plants like *Jasione* (monke), *Hypochoeris* (rotfibbla) and *Trifolium arvense* (harklöver) are used in the reconstructed landscape in Biparadiset (Växsjö kommun 2013). I. Runeson<sup>1</sup> tells that the plant species were chosen by the municipality ecologist in Växsjö and seeds and plug plants were then produced by Pratenis. Vattenparken (the waterpark) in Örebro was also created together with a municipality ecologist. Also



*Meadow created at the private homestead of Inger and Mats Runeson, Småland.  
Photo: Ingrid Runeson, 2011.*



*A paradise for bees created on sandy and hilly landscapes, Biparadiset, Växsjö.  
Photo: Ingrid Runeson, 2012.*

<sup>1</sup>Inger Runeson, Pratenis, conversation 21 October 2013



# CASE STUDIES

here a former industry area was transformed into a park with an ecological concept. Seeds from Pratensis were used to create vast meadow areas of native species.

I. Runeson<sup>1</sup> inform that seeding is the main form of establishment used by Pratensis. In the establishment of the roundabout in Liselena, Enköping seeding was the only method used. To get a faster result it is common that seeding is complemented by planting of plug-plants. The seed mixtures Pratensis are creating are adapted to different biotopes and climates. Generally the soil needs to be poorer than the existing soil and therefore it is often necessary to prepare the soil. I. Runeson<sup>1</sup> recommends three different methods for soil preparation. Firstly, to grow nutrient-absorbing plants one year before the establishment of the meadow. The second method is to take away the topsoil that is the most nutrient rich part and the third method is to add poor soil on top of the existing ground cover. In the example of Laholm, the meadow was established on top of crushed material from constructions which are rich of chalk.

I Runeson emphasizes the importance of proper maintenance for the result of meadows to be satisfying. Maintenance should be done by annual haymaking in the end of the summer when the flowering period is over. Most convenient is the use of scythe which also allows the cultural tradition of slättergille (haymaking event) but maintenance by cutting machines is also an alternative. The hay should then be left on site for a couple of days to be able to set seed before it is removed. In the example of Bethåga kyrkogård the hay is used for biomass production and then used for the busses in Uppsala municipality.

I Runeson<sup>1</sup> tells that perennial meadow-species do not flower during the first season so seed mixes for meadows by Pratensis also includes annual seeds that gives the meadow flowers already the first year. Examples of annuals Pratensis are using are *Centaurea Cyanus*(blåklint), *Papaver* (valmo) och *Agrostemma* (klätt). Mixes of annual seeds are also used as decorative meadows in private gardens



*Roundabout with meadow created only by seeding. Liselena, Uppland.*

*Photo: Ingrid Runeson, 2011.*



*Meadow created on crushed construction material, Laholm.*

*Photo: Inger Runeson, 2011.*

<sup>1</sup>Inger Runeson, Pratensis, conversation 21 October 2013



# CASE STUDIES

## *Reflection case study*

Three different case studies with different scales and approaches have been reviewed. Pratensis and Hichmough & Dunett are both working with larger scale plantation with inspiration from wild vegetation. Due to Hitchmoughs and Dunett use of exotic plant material their plantations look more “plantation like” while Runesons native meadows look more “natural”. Their approaches are also a bit different. Dunett and Highmough are strongly driven by aesthetically concerns while Pratensis main focus is ecological. Since people in general seem to question natural landscapes in urban contexts Hichmough and Dunetts approach is interesting. Here wilder-looking vegetation beneficial to biodiversity is well enrobed in an aesthetically appealing way that might be easier for people to appreciate. Whether it is sustainable or not to use exotic plants in an outdoor environment is a highly debated question. Hichmough claims that a plantation can be sustainable even if it contains exotic species as long as the plants are adapted to the habitat they are put into. However it is difficult to know if or when non-native species will stay in balance or become invasive. Throughout history it’s been discovered that non-native flora can be highly competitive in their new climate and take over large areas and even spread through whole country. Biodiversity is important in supporting ecosystems and when one or a few species spread over large areas the native species are often ousted and the biodiversity of the area is lost.

The grass free lawns Smith has developed consist of native plants as well as cultivated native plants to reach a more interesting aesthetic expression. The appearance of the grass free lawn is most similar of the three cases to a classical lawn since it is a short cut vegetative carpet. Since it is possible to sit, walk and do other activities on a grass free lawn it has opportunities to provide similar ecosystem services as a classical lawn.

If the establishment of meadows, naturalistic plantations and grass free lawns are compared it is probable the grass free lawn that is the most complex and expensive alternative. Grass free lawn can work better in smaller scale since it looks tidier and requires more maintenance. All three cases have high aesthetic values as well as a diverse selection of plants, which could increase urban biodiversity.



*Naturalistic planting in Olympic Park containing exotic flowers.  
Photo: James Hitchmough, 2012*



*Perennial wildflower meadow with only native species by Pratensis.  
Photo: Inger Runeson, 2011.*



*A short carpet of forbs similar to the lawn.  
Photo: Lionel Smith, 2012.*



*DESIGN of  
TRAIL*

# CONCLUSIONS

## *litterature study*

*\_What could an alternative sustainable lawn look like in the Swedish urban landscape and how can alternatives be communicated through a demonstration site in Ultuna Campus?*

*This chapter contains a design proposal for the "Alternative Lawn Trail" at SLU, Ultuna with practical examples of how alternatives to the conventional lawn can be designed. The chapter begins with a synthesis of the knowledge gained in the literature-and case studies and how it is used in the design. For the design of the trail we have also reinterpreted the task and developed a concept for the trail that has guided the design. Further on an analysis-part explains the background to the choices we have made for the location and the appearance of the trail-design. In the final section of this chapter a trail-design is proposed with different alternatives to lawn and examples of what they could look like and how they can be built up.*



### LITTERATURE & CASE STUDIES

Through literature studies and case studies we have found important factors to consider in the design process. These factors will work as guides to reach the goal of designing "the sustainable lawn trail".

### SITE ANALYSIS

To be able to place the trail and get a good understanding for the site conditions and what plant material that could be used, we did different analysis such as, vegetation, spatiality and ecosystem services analysis at SLU Campus

### TASK LAWN TRAIL

On requests of the LAWN research group we took on the task to create a "Lawn Trail" on Campus, Ultuna. This lawn trail is required to work as a demonstration site for alternatives to the conventional lawn.

### WORKSHOPS AND MEETINGS

During the autumn 2013 we have participated at workshops and meetings together with the LAWN research team and invited guests. Though the research is still in its first year our design has mirrored the ongoing discussions and results from the pilot study as well as themes and conclusions brought up during workshops.

### INTERPRETATION OF THE TASK

Lawn is seldom an object in itself but part of a context. To be able to demonstrate to the public how alternatives to lawns can be used in urban contexts we went to Uppsala and identified different "lawn situations". These urban lawn situations have then been taken in consideration when working out the "trail" design.

**TRAILDESIGN**

# CONCLUSIONS *literature study*

## Design STRATEGY

We have created a conceptual design over the trail demonstrating sustainable alternatives to lawns in an inspiring way. To be able to develop the site we have used conclusions from the literature studies, case studies and workshops with the research team. We call these conclusions design aim and design tools. The selected design tools are plant material, maintenance practice and social preferences. We have worked with these to reach the design aim, to create alternative lawns that provide more ecosystem services than a conventional lawn.

### DESIGN TOOLS

#### *Plant material*

The choice of plant materials affects what kind of expression the alternative lawn will have, what kind of ecosystem services it will provide and what kind of maintenance the lawn will require. Flowering plants provide pollen for pollinators. A high diversity of plants can increase biodiversity especially if native endangered plants are established. Plants also provide food for birds and through that the birds spread the seeds long distances. The plant material also plays a crucial role in the aesthetic appearance of the alternative lawn. To find the “right” plant material it is important to have knowledge about existing abiotic factors on the site and what kind of plant material is suited to these circumstances. Well adopted plants require little maintenance and will establish well without becoming invasive at the site.

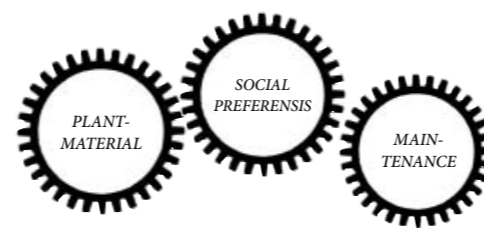
#### *Maintenance*

Maintenance is relative to what ecosystem services the lawn can provide. Different kinds of maintenance give different

CO2 emissions, it also affects the biodiversity of a lawn. With the right stress and disturbance species-rich sites can be created. How the lawn is maintained opens up for different social activities that can be displayed on the lawn, it also affect how it is perceived. In the search for a sustainable alternative lawn the maintenance is a factor that needs to be considered in the early state of the design process. A plan for how the site will develop and will be maintained over time will help to create a more dynamic view of lawns.

#### *Social preferences*

Throughout history man has created cultural preferences concerning lawns. These preferences are sometimes contradictory and what is socially sustainable might be less biological sustainable and vice versa. This issue is important to consider in the design. One of the reasons for the lawns popularity can be the cultural ecosystem services it provides as for example, sport, recreation and social meeting.



### DESIGN AIM

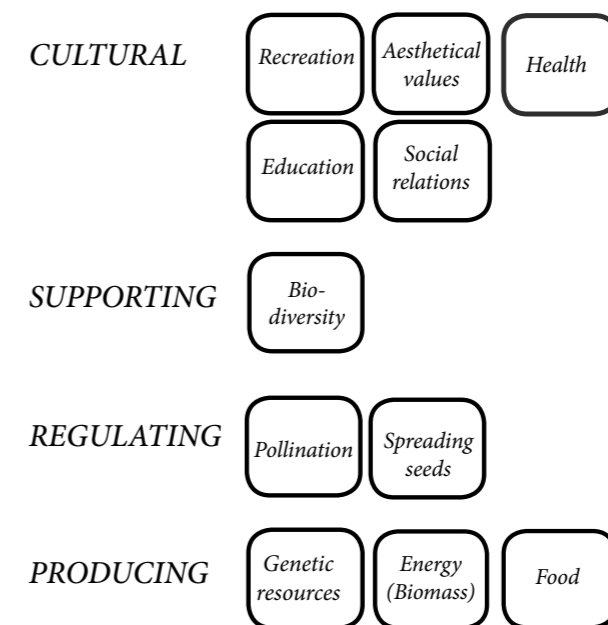
#### *Ecosystem Services*

Ecosystem services are a way to measure sustainability that is relatively new in urban planning. We propose to use it as a tool to evaluate sustainability at a smaller scale. Through our studies we have found that “ecosystem services thinking” can be useful in the work of landscape architecture as it considers many important factors like economy, ecology,

biodiversity and social sustainability simultaneously.

The aim with the design is to develop alternatives to lawns that can provide ecosystem services to a higher extent and require less maintenance than a conventional lawn.

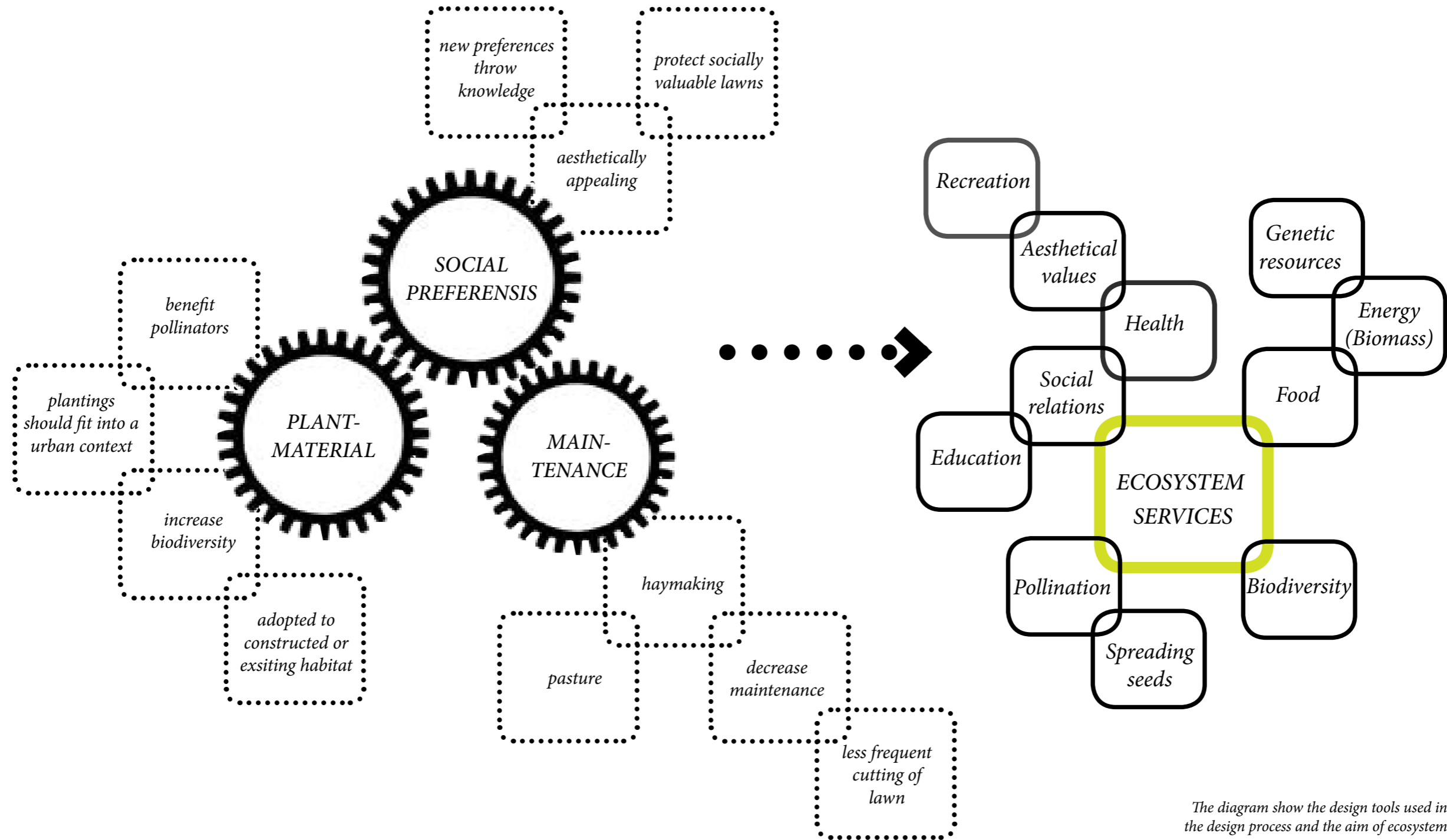
We have looked at all the ecosystem services and will use ecosystem services that are related to lawns or alternative lawns in a discussing evaluation. Ecosystem services that are irrelevant to the subject are: biochemical medication, materials (animal and plant fibres) and nature medication. Since we have investigated how landscape designers can develop design with an ecosystem thinking we have not used services that require specific data from other professions to be analysed such as noise reduction, cleaning of air, cleaning of water, climate regulation, photosynthesis, soil formations, nutrition cycles, regulation of pests, soil formations and water filtration. We have aimed to give a design proposal over the site so it can provide the following ecosystem services:





# CONCLUSIONS

*litterature study*  
Design STRATEGY



The diagram show the design tools used in the design process and the aim of ecosystem services.

# ANALYSIS

## *Lawns in URBAN CONTEXTS*

The lawn is seldom an object by itself but is part of a context. The aim with the alternative lawns is that they should be applicable in urban environments. The conventional lawns fulfil different purposes depending on where it is placed. To be able to suggest reasonable alternatives that are adapted to different urban situations we have conducted a study of where conventional lawns can be found in central Uppsala. We have come up with our own classification which combines eight different “lawn categories” or lawn types that correspond to different contexts where the lawn can be found in an urban areas.

To categorize the different grassed areas we looked at

1. Function
2. Maintenance
3. Ownership: private, semi private or public
4. Size
5. Location in the city



**PARK** often used for social meetings, sport and recreation. They are also important representative places for a city and needs to be highly aesthetic. For this reasons the lawns in parks are frequently cut. Lawns that we include in the category “parks” have a central location in the city and are public. It is important that parks have areas for social activities that can resist a high amount of wear. Other alternatives that provide other types of ecosystem services than the cultural are probably most suitable in the areas of the park that is less exposed for wear.

**LOW ACTIVITY PARK SPACE** The low activity park space often located inside or in between neighbourhoods. In these areas people usually do not spend much time more than walking or cycling through and occasionally use the lawn for social activities. The area is maintained less often than inside the city but the lawn is still well cut. Since lawns in these areas are not highly used for social activities the lawned area could be reduced and replaced by alternatives. Alternative solutions in these areas could be constructed to benefit biodiversity, pollination and give new recreational values.

**COURTYARD** Courtyards are usually semi-public spaces used by the people that live in adjacent houses. The lawn here is often well cut and well appreciated. Maintenance is done either by enterprises or by the inhabitants themselves. It is important to keep the social values while establishing alternatives. For example could just the edges of the lawn be changed into other more biodiverse alternatives that also benefit pollinators. Though the courtyard is semi-private, people might interact with their environment and alternatives that could be used as nature medication, food or for educational purposes could be introduced.

**GARDENS** - are private spaces maintained by the house owner. Since people often found it important that their garden look tidy, the lawn is usually cut often and might even be fertilized. Depending on the size of the garden the size of the lawn differs but in most cases it covers the main part of the garden. The lawn in a garden is well used but it is not exposed for wear in the same amount as for example a lawn in a public park. Here there are possibilities to create an alternative that demands a bit more attention if the owner is interested in gardening.

# ANALYSIS

## Lawns in URBAN CONTEXTS



**URBAN FIELD** are relatively large, less frequently cut grassed areas. These areas are often located in the outside border of an urban area close to nature areas. It is occasionally used for social activities but mostly people just cycle or walk through the area. According to Westerlund<sup>1</sup>, head of greenspace management at Uppsala Municipality, these areas are often objects for future exploration of houses and to protect these areas it is important that an alternative can provide recreational values, be ecological sustainable and require a minimum of maintenance.



**ROADVERGES** are found along roads, in roundabouts and other types of traffic environments. The areas are public but not used for social activities such as recreation or sport. The lawn is mostly decorative well cut and has different shapes. It is of value that an alternative can be maintained less frequently since a traffic environment is an unsafe place to work in. An alternative should aim to contain a higher biodiversity and be aesthetically valuable. An alternative in these areas does not need to resist wear from humans.



**LEFT OVER SPACES** we have called areas with lawn that are not used for social activities and are located in places that do not have high spatial quality. These spaces can be found almost everywhere in a city. As well as road verges these areas do not provide specific cultural ecosystem services and an alternative to providing ecosystem services, easier maintenance and another kind of aesthetic could be created here instead.



**DECORATIVE PATCH** - a category similar to the left-over spaces but smaller in size. Decorative patches are often located in the city centre, in public and semi-public areas with hard surfaces around. Like road-verges they are difficult to maintain since the area often is small and one can question if it is really necessary to keep spots like this so "clean". Letting small patches like this become wilder and more bio diverse might have a big impact on a wider city scale.

<sup>1</sup>Per Westerlund, head of greenspace management in Uppsala, conversation during meeting with the lawn research group at SLU, 21 October 2013



# ANALYSIS

## Placement of trail at SLU CAMPUS

The demonstration site is supposed to work as inspiration for landscape architecture students, employees, visitors as well as a test site for the ongoing research about lawns at SLU Ultuna. To meet this requirements the lawn trail will be placed at the Campus in Ultuna, South of Uppsala. The Campus area is relatively large and since we found it important for educational purposes that the visitors easily can walk through the site and overview and compare different alternatives to the conventional lawn we decided to concentrate the lawn trail to a smaller part of campus.

To find the location for the lawn trail we did an inventory of what kind of lawns that existed on campus and how they are maintained. This gave us an understanding for where on campus it was reasonable to change existing lawn into other sustainable alternatives.

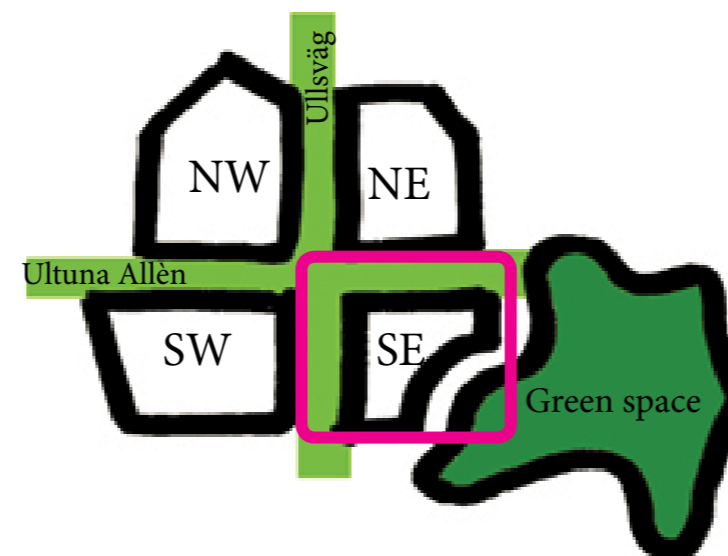
To be able to place and design the trail in a way that existing values could be protected and increased we analysed how students, visitors and employees use and move around on Campus.

Between 2008 and 2015 the University Campus SLU will also be highly expanded and developed and maps and documents about the vision of the future Campus had to be investigated. In the near future the institute for Landscape Architecture, planning and management as well as the department for economy will be built. This is a big investment and will result in the change of the surrounding environment as well as buildings.

In the campus vision for 2015 published by Akademiska hus and SLU the new campus is planned to be green, beautiful and sustainable (Andersson et al. 2008). The future area is divided in four different sections, where different activities take part and where the South East area is the area with the

less existing elements as well as open space with no plans for future development.

Observations of the “urban lawn situations” were also taken into consideration as the demonstration trail is supposed



Framed in the south east corner are the area of our site.  
Illustration: Akademiska Hus and SLU

### ULTUNA CAMPUS 2015

#### North west

The North West part of campus Ultuna includes education and laboratories for ecology as well as greenhouses and plantation halls. In the centre of the North West part a large public sport hall is located. There are also plans for extended parking as well as a dam for daily runoff (Adersson et al. 2008).

#### South West

Main part of the area in the South West part of campus is occupied of a project called UDS/VH-project. Today the

ground is agriculture and will also in future also be used for runs and paddocks (Andersson et al. 2008).

#### North East

The North East part of campus will be dominated of new large buildings for education. The outdoor environment consists of a new built demonstration garden as well as the remaining old demonstration garden that been kept. There are visions of extend the demonstration gardens to become an even larger part of the outdoor environment in the North East part (Andersson et al. 2008).

#### South East

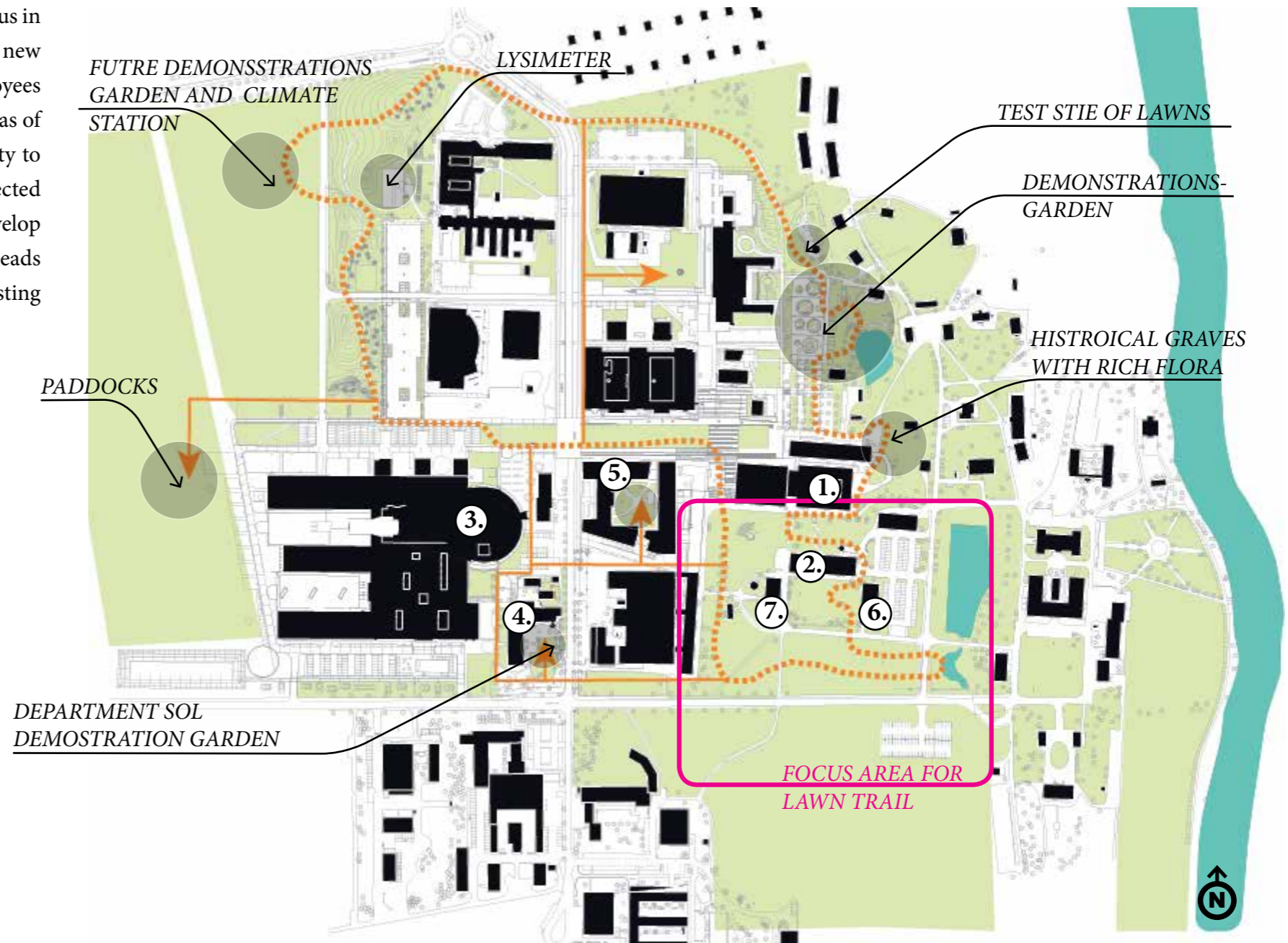
The buildings in the West part of the South East area will be renovated and extended and work as a frame to the large outdoor environment that will be kept intact (Andersson et

# ANALYSIS

## Placement of trail at SLU CAMPUS

The site chosen is placed in the south area of SLU campus in the vicinity of the library, the restaurant Syltan and the new Landscape architecture school. Many students, employees as well as visitors walk through this area daily. Vast areas of lawn are here linked to each other and gives possibility to create a trail in one and the same area that are connected to a larger park structure. We saw a possibility to develop this site and connect it a longer “knowledge trail” that leads through the green areas at Campus and exhibits existing varieties of knowledge.

- ① LIBRARY
- ② RESTURANT
- ③ VETERINARY SCHOOL
- ④ DEPARTMENT FOR LANDSCAPE ARCHITECTURE
- ⑤ NEW DEPARMENT FOR LANDSCAPE ARCHITECTURE
- ⑥ STUDENT COMMUNITYHOUSE
- ⑦ SPORT FACILITY
- PROPOSED “KNOWLEDGE-TRAIL”



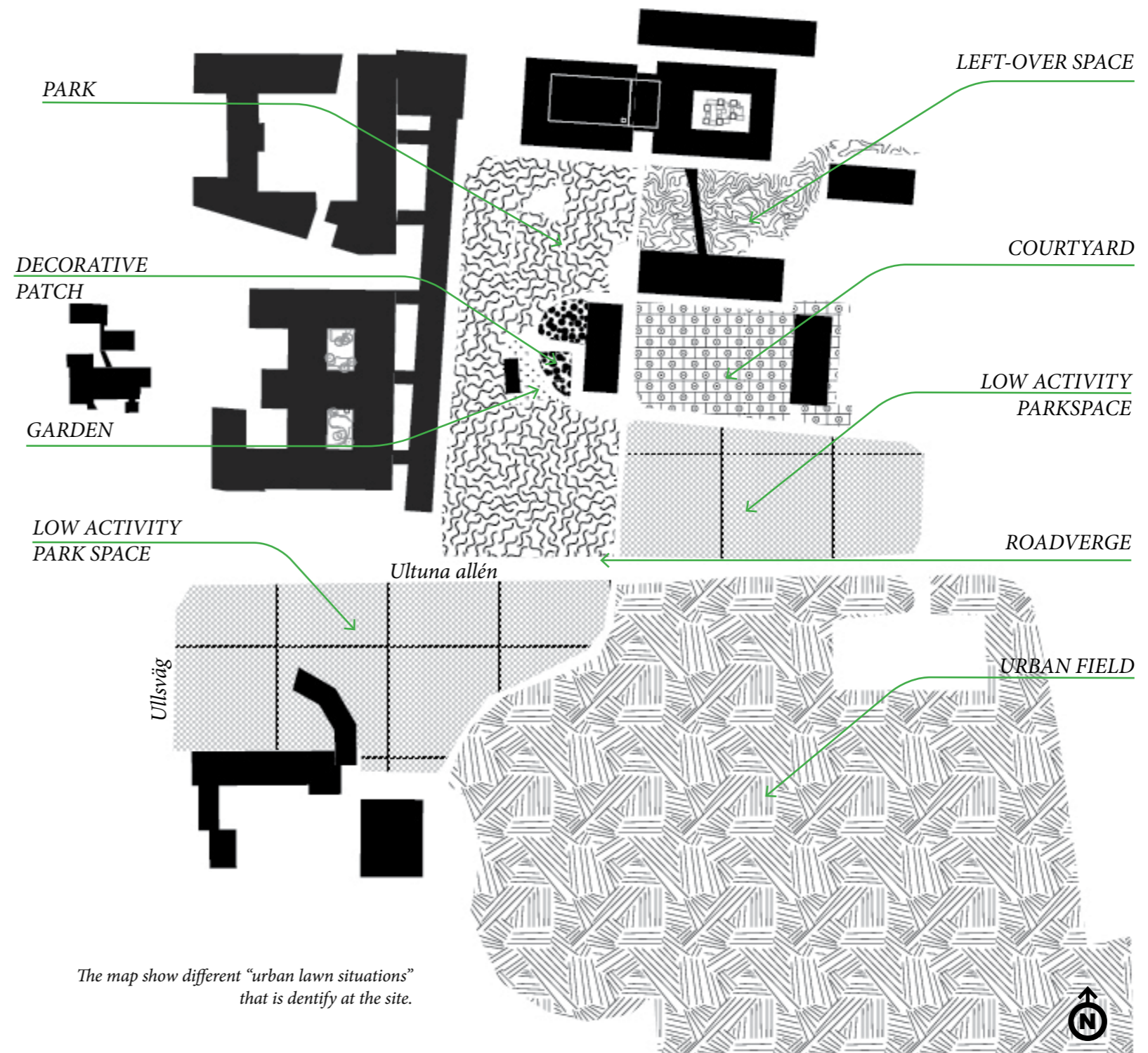


# ANALYSIS

## from CITY to SITE

### “LAWNSITUATIONS” at Campus

At the site we found eight different lawn spots that could correspond to lawns in urban situations. This creates a possibility for visitors at the site to connect and see how these alternative lawns can be implemented in an urban context. We have named the different areas corresponding to the eight urban categories we could find in Uppsala city. We have identified these eight urban situations by looking at how the lawn is used, where it is located and how it is maintained.



The map show different “urban lawn situations” that is identify at the site.

# ANALYSIS

## Micro CLIMATES

To be able to develop a suitable plant selection for the site an analysis of the existing habitats has been conducted. The soil contain sand and clay, and is more moist on lower altitudes where the soil contain a higher amount of clay than in high altitude and sloping terrain that consists of a higher percent of sand and is dryer. Along the western slope of the site trees created shade and the ground here is dry and shady. In the middle of the site the lawn is formed as a bowl and the middle of the quadrate is moister. The area east of the quadrate is close to a pond and is sometimes flooded by water.

The lawn consist of the most common grass species such as *Poa pratensis* and *Festuca rubra*.

In some places spring bulbs have been planted (that flower in the spring). An example of this is the area of *Fritillaria meleagris* that grows in the quadrate lawn in the middle of the site. The southern filed is partly a meadow with species like *Achillea millefolium*, *Ranunculus repens*, this area has earlier been a pasture.





# ANALYSIS

## ECOSYSTEM SERVICES

The site is covered by lawn that has a low variety of species, is frequent cut and contributes to high CO2 emissions and high maintenance costs. The site also has qualities that are identified and that will be considered when proposing a new design.

1) A smaller water pond with a higher biodiversity than surrounding lawn. Flowering plants here provides pollen for pollinators.

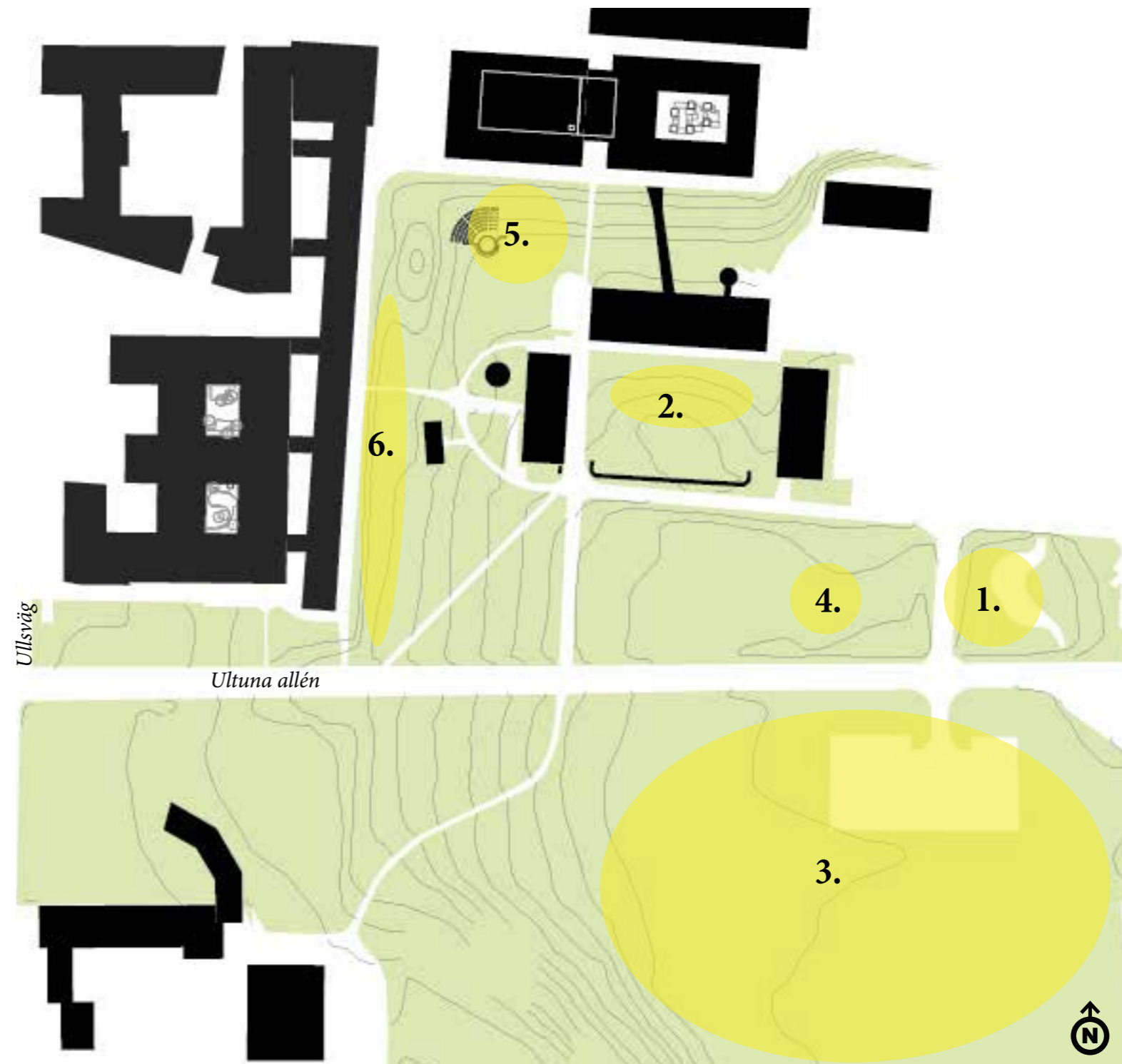
2) The lawn at the yard to the restaurant provides social ecosystem services in the form of recreation and social meetings. Though the lawn here is located in a relatively protected spot it has a lot of visitors on sunny days during lunch hours.

3) This area is covered by meadow like lawn and has a higher biodiversity compared to the surrounding lawn. Part of the flora contains flowering species favouring pollinators. This area also works for educational purposes where for instance landscape architect students study flowers.

4) In the bowl formed shaped lawn Uppslands flower icon *Fritilaria meleagirs* (kungsängslilja) grow. Occasionally this spot is left with less maintenance for the species to have a chance to establish. They are observed by students for educational purposes.

5) The center of the area is the most frequently visited spot for social meetings on campus, lots of student sit here in the sloop during warm days.

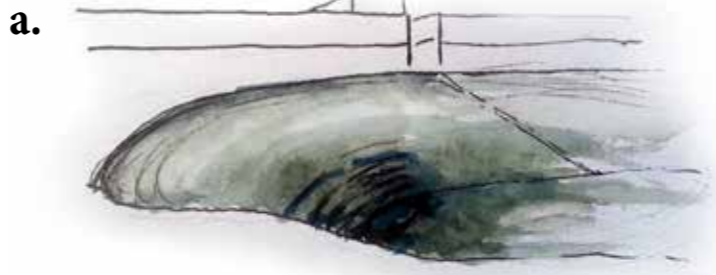
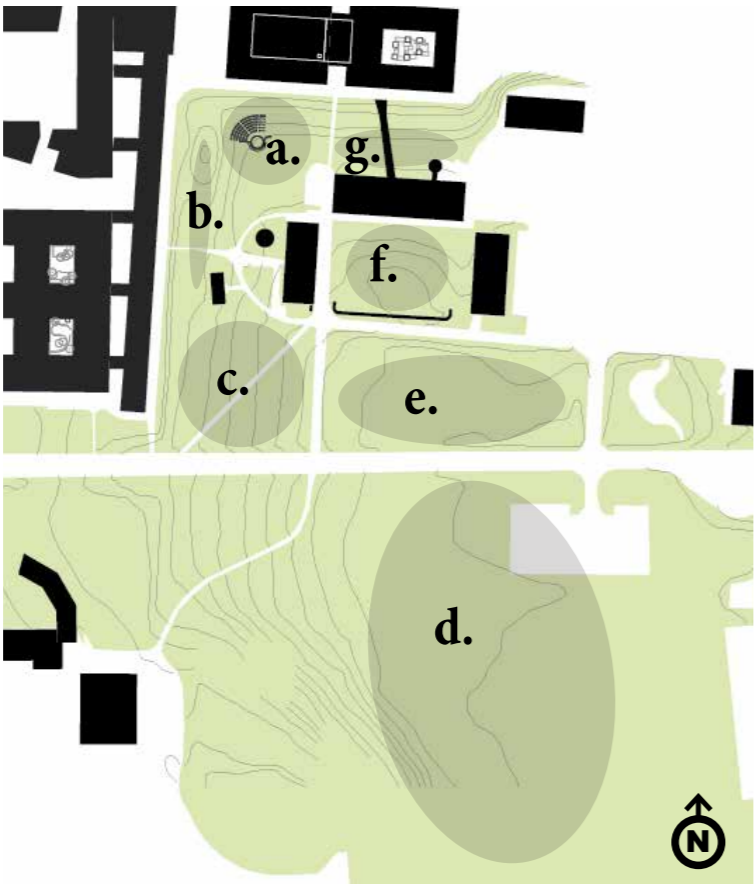
6) Along the west side of the site there is a strap of grass that is less maintained. This side has a more species rich flora in comparison to the well cut lawn.



# ANALYSIS

## CHARACTER & SPACES

To be able to find a design that could fit into already existing structures as well as being interesting by displaying different rooms for the visitor we did sketches over the existing spatiality and the different characters on campus. In the sketches the most dominant structures of the outdoor environment at the site are presented.



*Large circular sloping room*



*Alley of Fraxinus exelsior*



*Open slightly sloping room*



*Open rural room*



*Open bowled formed room*



*Protected framed room*



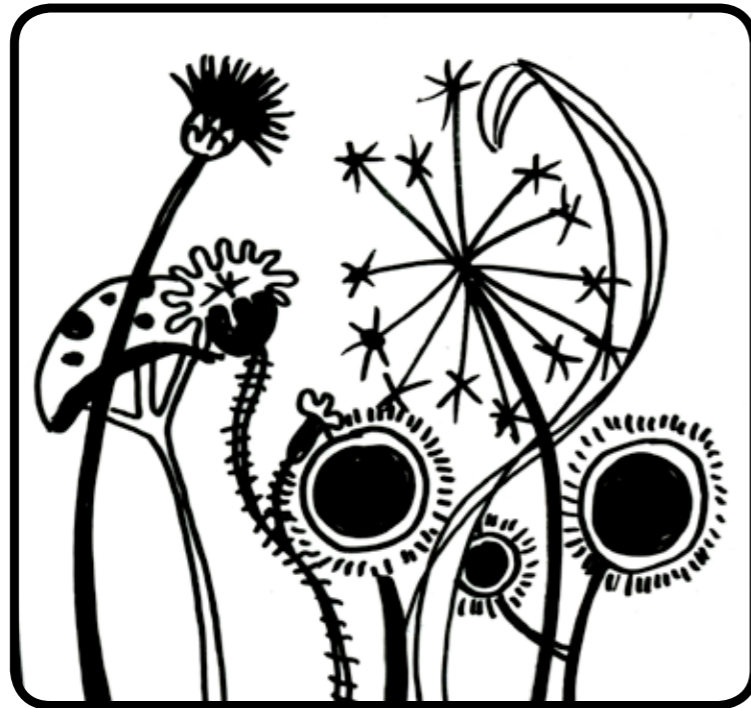
*Narrow room bordered by sloop and building*



# PROPOSAL

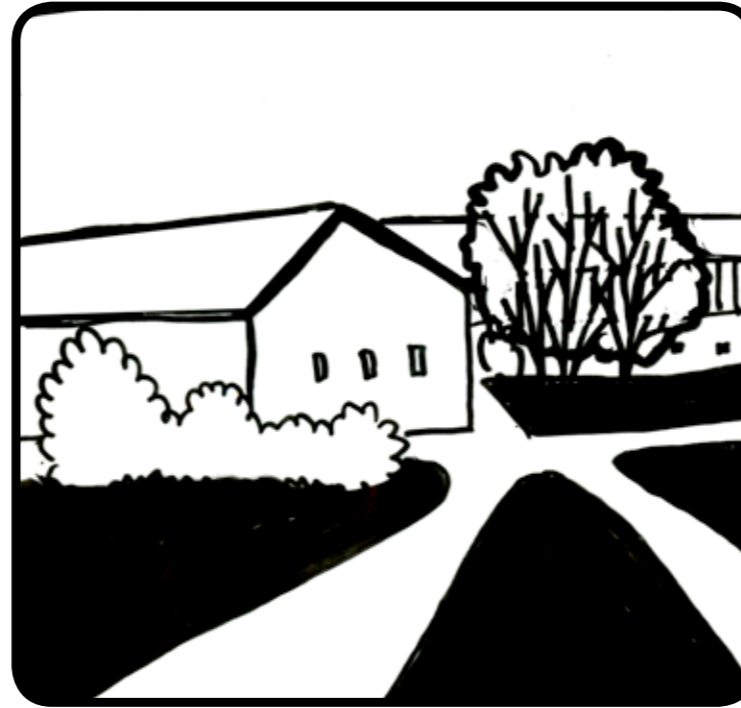
## *design statements*

### NATIVE SPECIES



As a conclusion from the literature study we have decided to only use native plants in our alternative lawns. We believe that there is a need for reinforcement of the native flora and that using these species could be both educative and create a stronger local identity to the Swedish urban environment.

### STRUCTURES



To suggest an economical realistic proposal we departed from the idea that we would not make any structural changes to site. The new design is placed in existing structures with roads and trees as they are placed today.

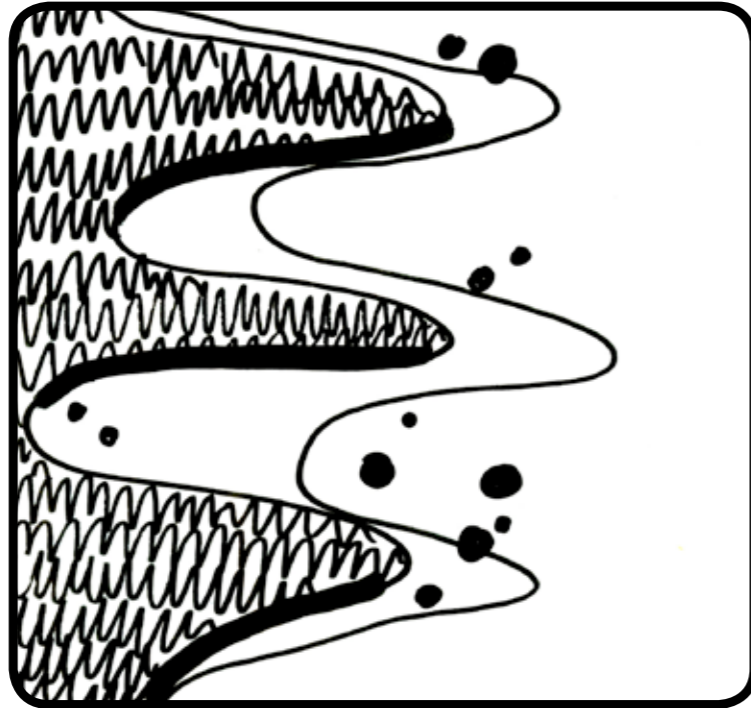
### MAINTENANCE



We have assumed that the demonstration site will be maintained by Uppsala municipality or the enterprise that runs the maintenance on Campus Ultuna today. A management plan will have to be worked out for the site where the maintenance for the first year will be relatively different to the following years.

# PROPOSAL *shape*

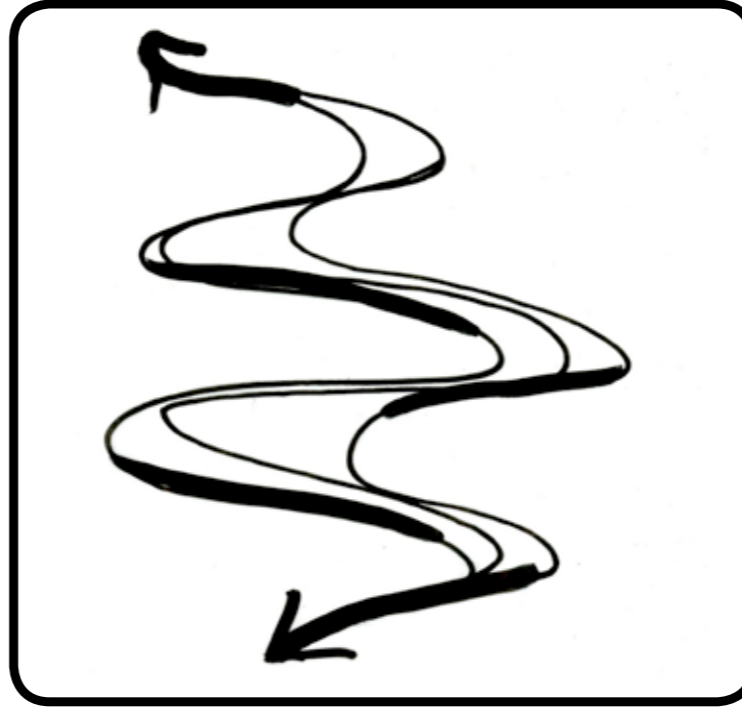
## BIODIVERSITY



*“Most natural edges are curvilinear, complex, and soft, whereas humans tend to make straight, simple and hard edges.”  
(Dramstad, Olson & Forman 1996)*

*Inspiration for the design of the trail has been taken from principles in landscape ecology design. Vegetative edges in the landscape that are curvilinear are richer in biodiversity, have more movement along them and benefit from interaction with the surroundings.*

## MOVEMENT



In our design a curvilinear walk has been created that leads between different alternative lawns that correspond to different urban situations and have different microclimates. The curvilinear walk also intends to invite to movement amongst people and make people walk the trail.

## SPACE & INTERACTION



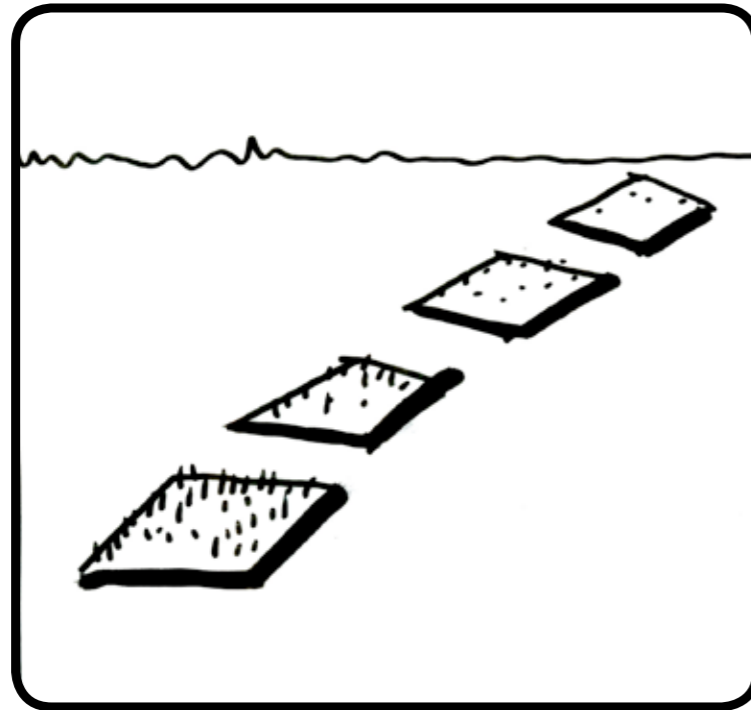
By letting the curvilinear path be wider at certain places, spaces are created where the walk becomes a room for social activities. The moving edge and the spaces also interact with the alternative lawns and information signs can be placed in the rooms created along the way.



# PROPOSAL

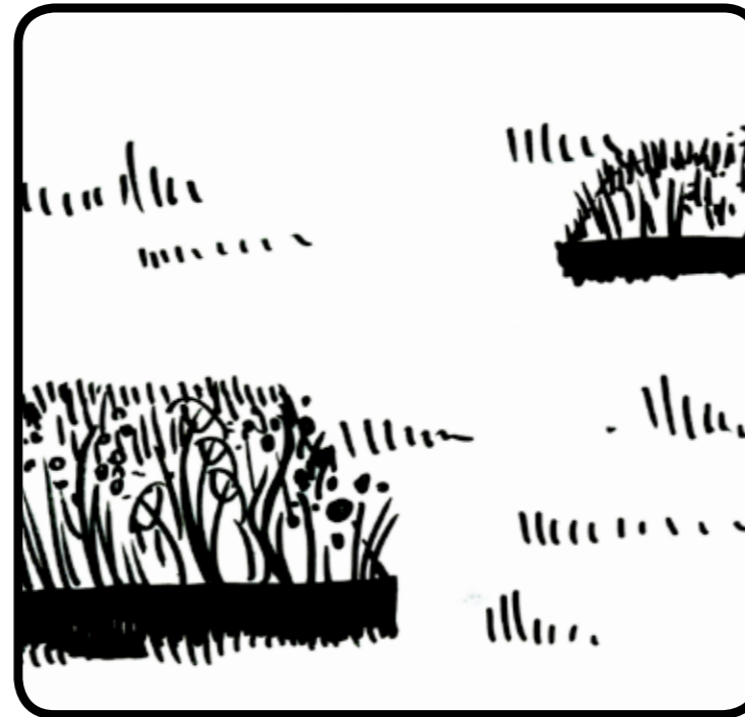
## *a site for research*

### STEP 1



A demonstration site for different kinds of conventional lawns already exists in the knowledge park at SLU.

### STEP 2



As a first step towards the establishment of the alternative lawns we propose that the research group make some tests where suggested plants are placed on future proposed locations and one can investigate their vitality and establishment after 2 years. For this, a kind of simple frame will be constructed around the plants to protect them from mowers. These small sites could then be incorporated in the final demonstration trail.

### STEP 3

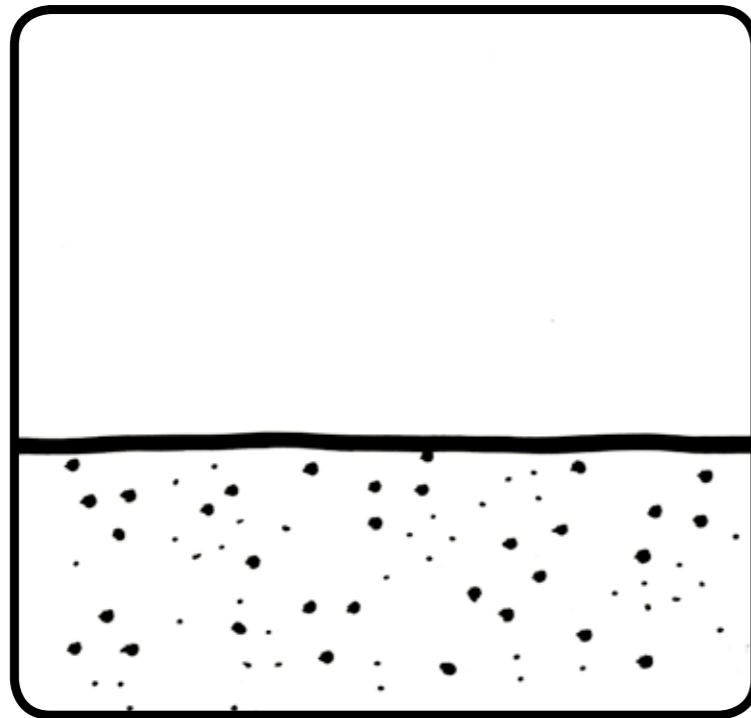


As a final step the demonstration trail is carried out with its different plant selections possibly modified and complemented.

# PROPOSAL

## *establishment*

### SEEDING



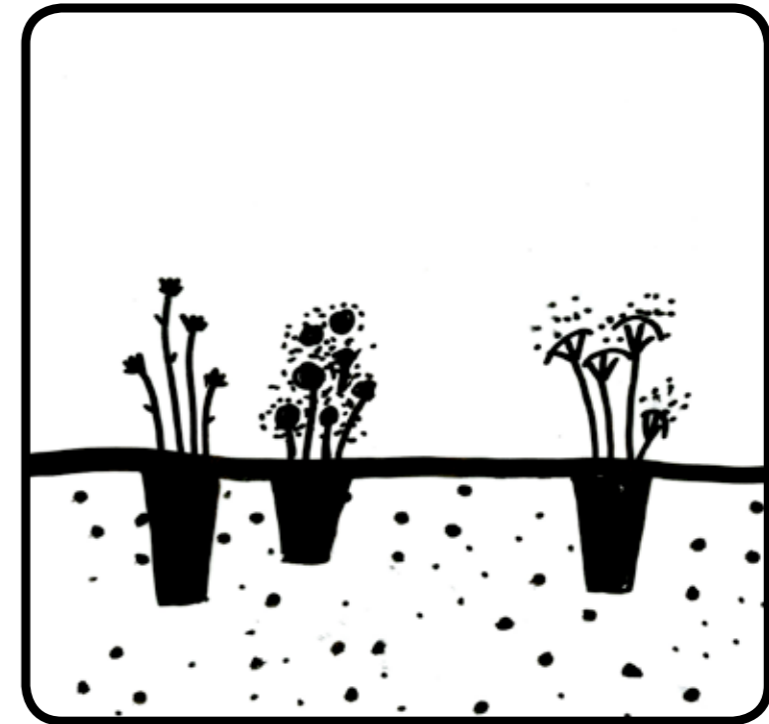
There are three methods that we suggest for the establishment of alternative lawns seeding is one of them. For the seeding two different methods could be used. One way is to remove the top layer of soil and seed in the subsoil. And the other method is to add a poorer top layer of soil suited to the plants that shall grow there. Seeding can be done in either August-September or in April-May.

### PLUGGING



To be able to keep down the cost and make the proposal realistic we have in many cases chosen to keep the top layer of lawn and enriched the biodiversity by plug plants. In the proposal this method is used where the conventional ground is poor and there is bare soil or if the area already have valuable species that should be kept.

### SEEDING & PLUGGING



In some cases we propose to use seeding and plugging in combination, this to get a quick establishment of plants. Seeding is first conducted with plug planting over the top.



# DESIGN of





# PROPOSAL

## DESIGN ELEMENTS

### **THE TRAIL OF CONVENTIONAL LAWN**

The trail that leads around the site is designed with the existing conventional lawn that is frequently cut. The purpose with the conventional lawn trail is to show the visitors that conventional lawn is just necessary at some places for accessibility and social activities. Since a conventional lawn is strict and non-dynamic we aimed for a design that was free and changeable. The lawn trail is shaped and maintained by lawn mower. This can be a bit challenging in the beginning but give future possibilities to create larger rooms or the trail to change in shape if required

### **FURNITURE**

The lawn trail displays different types of detachable furniture that are placed where the lawn trail create rooms. We propose a similar collaboration between furniture companies and SLU as in the example of the existing demonstration garden “Kunskapsträdgården”. Here companies sponsor with furniture and in exchange get to demonstrate their different design models to students, visitors and employees at SLU. With furniture made in different materials, colors and shapes the lawn trails is more interesting and different characters can be achieved in different rooms. To add an extra twist to the trail we suggest establishing swings in the alley, where people can view the meadow lawn from a different perspective.

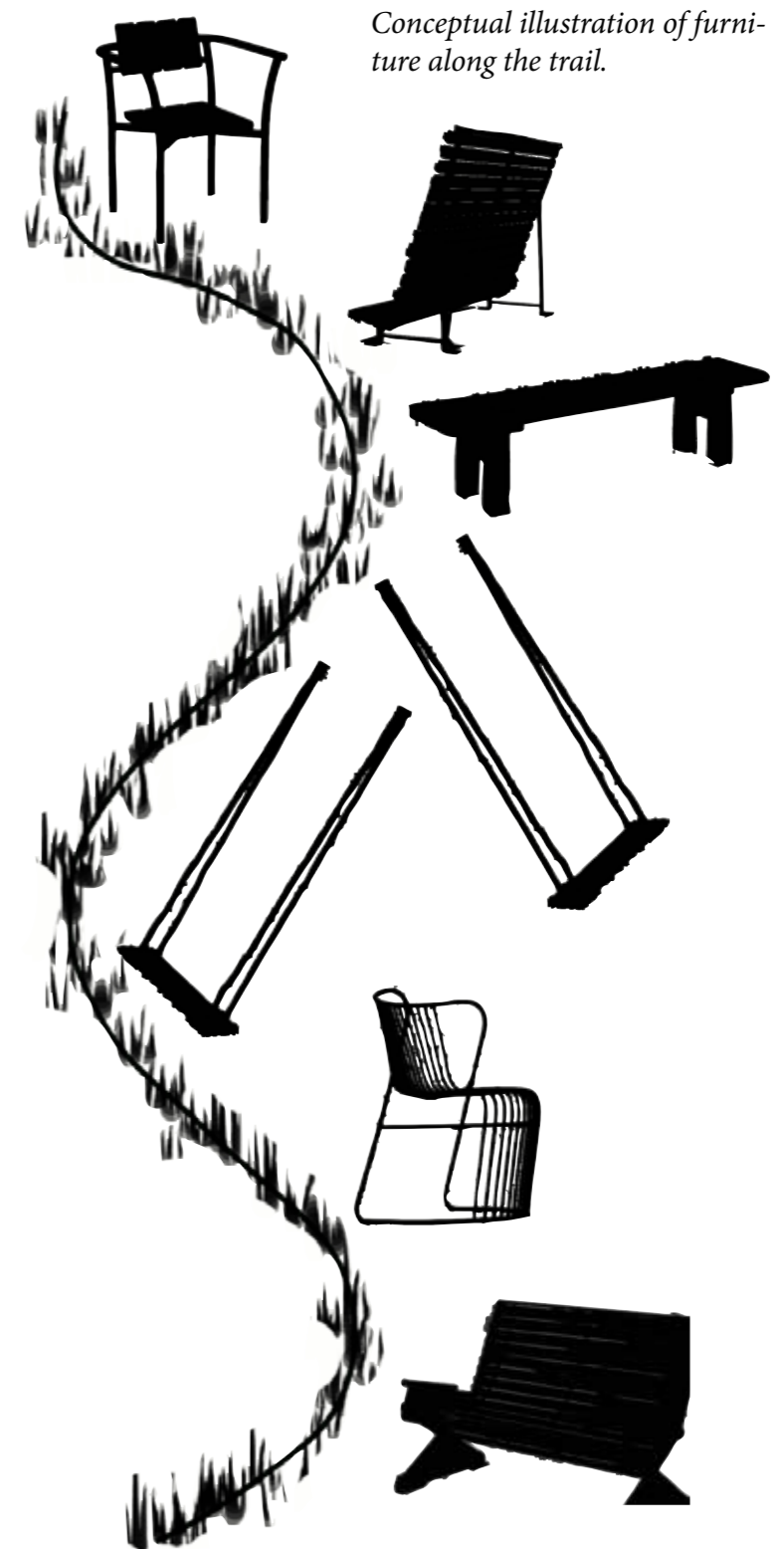
### **SIGNS**

We propose that there are signs placed in each lawn room that gives information about the alternative lawns that can

be seen from the room. Suggested information on the signs are information about species, maintenance, and sustainability aspects with alternatives compared with conventional lawns. In our proposal we have used the material corteen steel for signs and other details. Corteen steel is already used on other sites on Ultuna Campus and fits to the proposal though it gives a kind of urban character to the more rural expression of the alternative lawns.



*Example of sign in corteen steel*



*Conceptual illustration of furniture along the trail.*



*PASTURE  
LAWN*





# alternative LAWNS

## PASTURE LAWN (Betesgräsmatta)

In the outskirts of urban areas the lawns are often less maintained than in the city centre. They are also less important for recreation though there often are nature areas in the vicinity. An alternative to the conventional lawn here could be a Pasture lawn. Pastures are historical cultural conditioned habitats that have a high biodiversity thanks to the right stress and disturbance (Gustavsson et al. 1994).

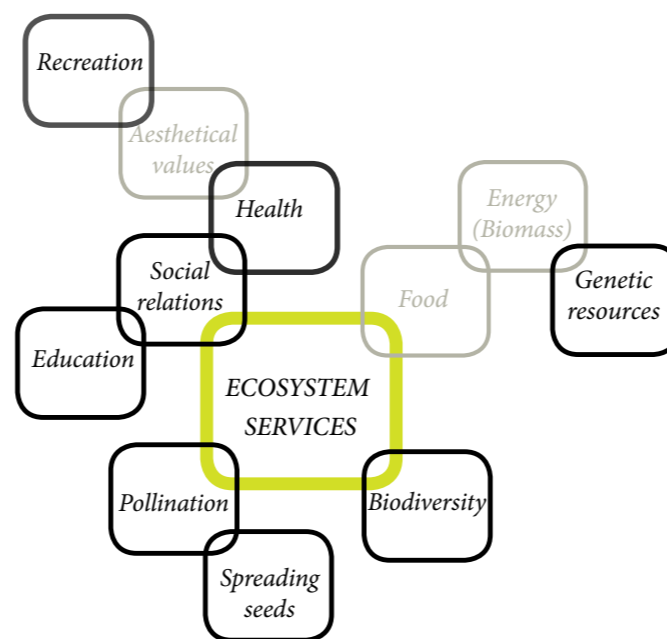
The Urban Field in our design is located south of campus. The Western part of this area is cut like a lawn and the Eastern part is a wilder meadow that joins the surrounding nature. In our proposal we suggest that this whole area becomes pastures. The method of maintaining grassed area by grazing is already in practice in Uppsala municipality. The department of veterinary as well as the veterinary hospital will be located in the south part of campus which opens up an opportunity to make these vast grass areas pastures for the animals that are kept there. In the Western part that today consists of conventional lawn we suggest that plants will be plugged in to increase the biodiversity faster. Plants have been chosen than can be found in pastures in the region around Uppsala but are more or less rare. The Eastern part of the vast grassland is already today a meadow that earlier has been pasture. Different herbs already grow here and possibly these species will establish themselves in the western pasture as well after some time.

### ECOSYSTEM THINKING

Grazing animals usually attracts people and the site can then contribute to make humans spend more time in nature which have a positive effect on human's health.

By using grazing as maintenance type the right balance between disturbance and stress a high biodiversity on the site can occur. Since the animal is taking care of the maintenance there will be no need for lawn movers and less CO2 emissions.

Complementing the western part with extra plug plants can help to increase biodiversity faster. Today there are some flowering species at the site, by enriching these as well as introducing new species pollinators will be favoured. By encouraging higher biodiversity at the site the genetic variation will increase. There are many species that today are threatened and dependent of the unique habitat that grazing provides.



Example of an urban field, located in the outskirts of the city.



Larger fields in urban areas can be used for grazing.



alternative  
LAWNS  
PASTURE LAWN



PLANT PROPSAL  
**URBAN FIELD western part**  
layout: plugging

habitat: normalmoist, sunny

*Ajuga pyramidalis* (Blåsuga)

*Briza Media* (Darrgräs)

*Gentianella campestris* (Fältgentiana)

*Hypericum perforatum* (Äkta Johannersört)

*Leontodon hispidus* (Sommarfibbla)

*Mentha arvensis* (Åkermynta)

*Phleum phleoides* H. Karst (Flentimotej)

*Pimpinella saxifraga* (Bockrot)

*Plantago media* (Rödkämpe)

*Platanthera bifolia* (Nattviol)

*Primula veris* (Gullviva)

*Salvia pratensis* (Ängssalvia)

*Silene nutans* (Backglim)

*Trifolium montanum* (Backklöver)

**URBAN FIELD eastern part**

Already existing forbs:

*Achillea millefolium* (Rölleka)

*Vicia sepium* (Häckvicker)

*Lotus corniculatus* (Kärringtand)

*Trifolium pratense* (Rödklöver)

*Geranium Sylvaticum* (Midsommar-  
blomster)

*Chamomilla recutita* (Kamomill)

*alternative*  
**LAWNS**  
**PASTURE LAWN**





GROVE  
LAWN





# alternative LAWNS

## GROVE LAWN (Lundgräsmatta)

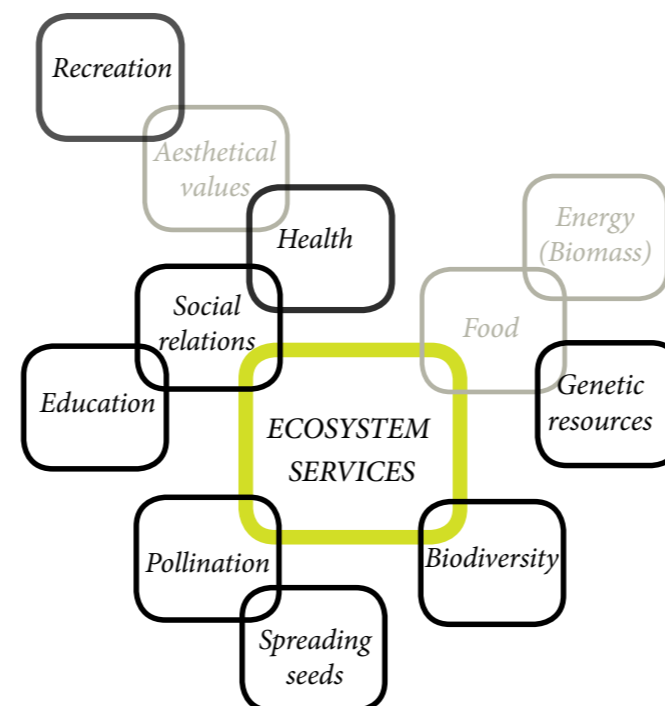
Instead of using conventional lawn in shadowed urban situations that are not trampled and does not promote any social activities we are proposing to increase the biodiversity by grove species. The Grovelawn has plants similar to the grove. Inspiration for plant material has been taken from Pratensis shadow-meadows in Småland as well as from examples of grove plantations described by Gustavson et al. (1994). At the demonstration site this kind of lawn is located in shadowed areas of the western slope and the area under the trees in the outskirts of the courtyard and park. The Grove lawn is constructed in two different styles with different plants mixes depending if the area is sloping or flat. In the sloping parts plug-in-plants are proposed that can stand some dryer habitat. In the flatter areas of the park and in the courtyard seeding is proposed. The top soil will then be removed to get poorer soil and to be able to seed in new species. In the plugged area current grass species will continue to grow while in the seeded areas new grass species will be introduced. The Grove lawn is maintained with scythe and the haymaking is done once a year after the flowering period in August. The vegetative material will then have to be taken away to keep the soil poor. If possible one could leave the material for some days so that it can spread seeds before being removed.

### ECOSYSTEM THINKING

During the flowering period the grove lawn will provide high aesthetical values with lots of flowering plants. During the year the aesthetical expression will change in colour and texture. The different plants can provide aesthetically appealing expression even during winter with its different inflorescences and seed heads.

With an increased variety in plant species that will be seeded or plugged on the spot it will also possibly host more animals, amongst them pollinators. With a higher biodiversity the genetic resource of this site will as well increase.

The site will work for educational purposes, both as a test site for the lawn research group, an information site for students as well as a demonstration site of alternative lawns for the public. The grove lawn is cut one to two times per year and the hay can be used as biomass in Uppsala municipality.



*A high amount of lawns are found in traffic environments, these are maintained frequently by mowers.*



*To reduce maintained as well as increase biodiversity grove lawn can be an option where the area is shadowed.*



alternative  
LAWNS  
GROVE LAWN



**PLANT PROPSAL**

**1. PARK in shady slope**

layout: pluggplants in existing grass

habitat: dry, shady

*Campanula patula* (Ängsklocka)

*Campanula trachelium* (Nässelklocka)

*Galium odoratum* (Myskmadra)

*Cardamine bulbifera* Crantz (Tandrot)

*Myosotis sylvatica* (Skogsförjätmigej)

*Potentilla erecta* (Blodrot)

*Silene dioica* (Rödblära)

*Veronica officinalis* (Ärenpris)

**2. PARK & COURTYARD**

in areas shaded by trees

layout: seeding

habitat: normal moist, shady

*Agrostis capillaris* (Rödven)

*Campanula latifolia* (Hässleklocka)

*Campanula trachelium* (Nässelklocka)

*Festuca rubra* (Rödsvingel)

*Geranium sylvaticum* (Midsommarblomster)

*Luzula pilosa* (Vårfryle)

*Melica nutans* (Bergslok)

*Melampyrum nemorosum* (Lundkovall)

*Melampyrum arvense* (Pukvete)

*Melampyrum cristatum* (Korskovall)

*Milium effuse* (Hässlebrodd)

*Myosotis sylvatica* (Skogsförjätmigej)

*Poa nemoralis* (Lundgröe)

*Potentilla erecta* (Blodrot)

*Stellaria holostea* (Buskstjärnblomma)

*Silene dioica* (Rödblära)

*Veronica officinalis* (Ärenpris)

*alternative*  
**LAWNS**  
**GROVE LAWN**





*MEADOW  
LAWN*





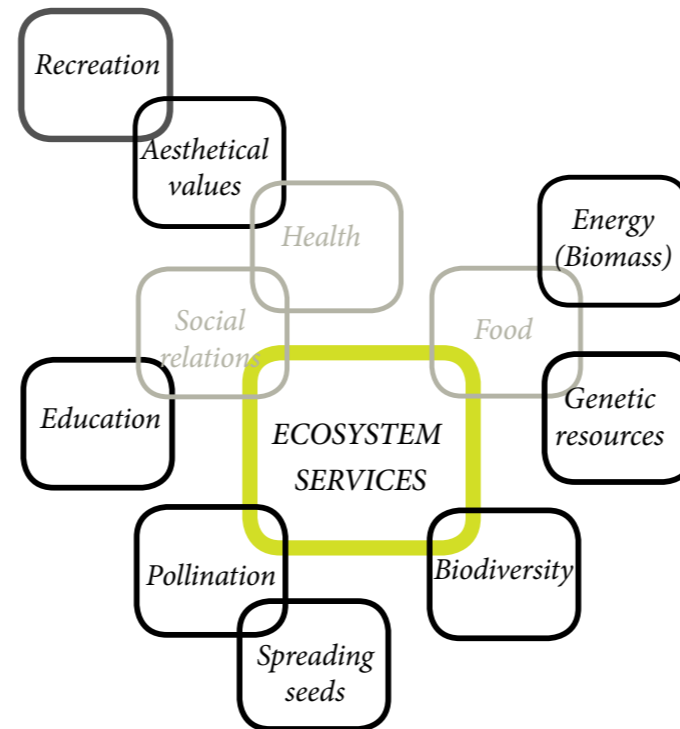
# alternative LAWNS

## MEADOW LAWN (Ängsgräsmatta)

In urban areas where the conventional lawn is not used for social activities it can be changed into a Meadow lawn that demands less maintenance and has higher biodiversity. At the demonstration site Meadow lawns are proposed at the areas corresponding to Park, Garden and Neighbourhood Park. Inspiration for the plant material in the meadow lawn is taken from the Olympic park and from Pratensis. The Meadow lawn can be constructed by seeding or with plug-in-plants or with a mix of the two techniques. At the demonstration site we propose plug-in-plants in the area where valuable species already grow, since this method does not demand a removal of the upper layer of soil. In the outskirts of the Neighbourhood Park close to the road two different constructing methods are proposed; plugging and seeding. The plugged area consists of higher plug-in-plants and the seeded area has new grass species and other flowers in various heights. The seeding method is also used in the Garden but here the grass-species have been removed and the meadow lawn consists only of flowers to give a highly decorative value. At the small water pond in the east of the Neighbourhood Park the meadow lawn is proposed to be constructed with plug-in-plants for humid conditions. The meadow lawn is maintained like the Grove lawn with hay-making once a year and removal of vegetative material after letting it lie and dry for a couple of days.

### ECOSYSTEM THINKING

The meadow lawn provides similar ecosystem services as the grove lawn and the pictorial lawn. This site will as well as the other parts of the demonstration trail provide education services but with other types of discoveries since all parts of the site contain a unique combination of plants and abiotic factors. As well as the grove lawn the aesthetical expression will change during the year but will differ from the grove lawn in colour and texture. The different plant height will create spatiality. Since the meadow lawn consists of a high amount of different types of plants this part of the site can possibly host a high variety of insects. It is possible that the edges where the different types of lawns meet will be especially species rich.



*There are less social activities in a “low activity park” since it is located in less central places in the city.*



*Parts of areas that are classified as “low activity part” can be changed to meadow to enrich biodiversity.*



# alternative LAWNS

## MEADOW LAWN



### PLANT PROPSAL

#### 1: GARDEN

layout: seeding

habitat: normalmoist, poor, sunny

*Agrostemma githago* (Klätt)  
*Anthemis tinctoria* (Färgkulla)  
*Campanula persicifolia* (Stor blåklöcka)  
*Campanula rotundifolia* (Blåklint)  
*Centaurea cyanea* (Centurea persicifolia)  
*Centaurea jacea* (Rödclint)  
*Dianthus deltoides* (Backnejlika)  
*Filipendula vulgaris* (Brudbröd)  
*Galium verum* (Gulmåra)  
*Hypericum perforatum* (Äkta johannesört)  
*Inula salicina* (Krisla)  
*Knautia arvensis* (Åkervädd)

*Leontodon hispidus* (Sommarfibbla)  
*Leucanthemum vulgare* (Prästkrage)  
*Lychnis viscaria* (Tjärblomster)  
*Malva moschata* (Myskmalva)  
*Papaver rhoeas* (Kornvallmo)  
*Plantago lanceolata* (Svartkämpar)  
*Silene dioica* (Rödblära)

#### 2: NEIGHBOURHOOD PARK

close to road

layout: seeding

habitat: normalmoist, poor, sunny

*Aquilegia vulgaris* (Akleja)  
*Arnica montana* (Slättergubbe)  
*Anthemis tinctoria* (Färgkulla)  
*Campanula persicifolia* (Stor blåklöcka)  
*Centaurea jacea* (Rödclint)  
*Centaurea scabiosa* (Väddclint)  
*Filipendula vulgaris* (Brudbröd)  
*Hypericum perforatum* (Äkta johannesört)  
*Knautia arvensis* (Åkervädd)  
*Leontodon hispidus* (Sommarfibbla)  
*Leucanthemum vulgare* (Prästkrage)  
*Luzula pilosa* (Vårfryle)  
*Ranunculus acris* (Smörblomma)  
*Rhinanthus minor* (Ängsskallra)  
*Rumex acetosa* (Ängssyra)  
*Silene dioica* (Rödblära)  
*Silene vulgaris* (Smällglim)  
*Succisa pratensis* (Ängsvädd)

#### 3. NEIGHBOURHOOD PARK

middle

layout: pluggplants in existing grass, low species

habitat: normalmoist, sunny

*Campanula rotundifolia* (Liten blåklöcka)  
*Dianthus deltoides* (Backnejlika)  
*Galium verum* (Gulmåra)  
*Hypochoeris maculata* (Slätterfibbla)  
*Luzula pilosa* (Vårfryle)  
*Leucanthemum vulgare* (prästkraige)  
*Plantago lanceolata* (Svartkämpar)  
*Plantago media* (Rödkämpar)  
*Primula veris* (Gullviva) apr-may  
*Polygala vulgaris* (Jungfrulin)  
*Scorzonera humilis* (Svinrot)  
*Veronica officinalis* (Ärenpris)  
*Viola tricolor* (Styvmonsviol)

#### 4. NEIGHBOURHOOD PARK

east

layout: pluggplants in existing grass

habitat: moist, sunny

*Bistorta vivipara* (ormrot)  
*Caltha palustris* (Kabbleka)  
*Cardamine pratensis* (Ängsbräsma)  
*Cirsium helenoides* (Borsttistel)  
*Iris pseudacorus* (Gul Svärdsilja)  
*Lychnis flos-cuculi* (Gökbloster)  
*Lytrum salicaria* (Fackelblomster)  
*Trollius europaeus* (Smörbloll)



*alternative*  
**LAWNS**  
**MEADOW LAWN**



*Normailmoist meadow by Pratensis. Photo: Inger Runeson 2012*



*Wet meadow by Pratensis. Photo: Inger Runeson 2012*



*Lythrum salicaria*  
 Photo: Inger Runeson



*Rhianthus minor*  
 Photo: Anna-Lena Anderberg



*Leucanthemum vulgare*  
 Photo: Inger Runeson



*Centaura jacea*  
 Photo: Inger Runeson



*Primula veris*  
 Photo: Inger Runeson



*Cardamine pratensis*  
 Photo: Inger Runeson



*Trollius europaeus*  
 Photo: Anna-Lena Anderberg



*Iris pseudacorus*  
 Photo: Inger Runeson



*PICTORIAL  
LAWN*









*alternative*  
**LAWNS**  
**PICTORIAL LAWN**



*PLANT PROPSAL*

**1: PARK**

**2: NEIGHBOURHOOD PARK close  
to road**

**Layout: seeding**

**Habitat: normalmoist, poor, sunny**

*Agrostemma githago (Klätt)*

*Anthemis arvensis (Åkerkulla)*

*Centaurea cyanea (Blåklint)*

*Papaver rhoeas (Kornvallmo)*

*Papaver dubium (Rågvallmo)*

*alternative*  
**LAWNS**  
**PICTORIAL LAWN**





*GRAVEL  
LAWN*





# alternative LAWNS

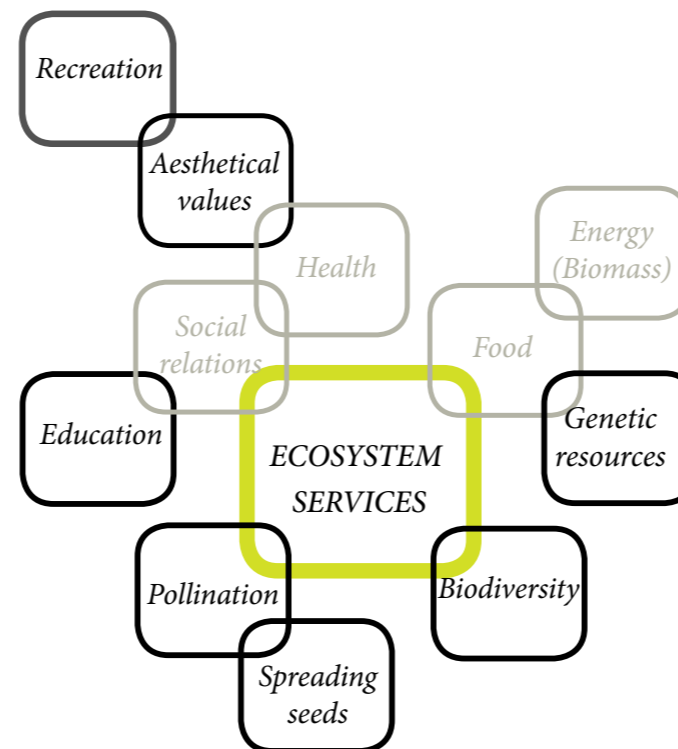
## GRAVEL LAWN (Torrbackesmatta)

In urban areas today conventional lawns even cover spaces that are not suitable for grass such as sun exposed sloped areas. In dry slopes in urban areas it is possible to instead choose plants that are adapted to this climate and therefore can live there without requiring a high amount of maintenance. A gravel lawn is designed with plants that are adjusted to sunny, dry and sandy climates. In the lawn trail at SLU we have used this concept in slopes that is too dry for conventional lawn to establish well and in an area that correspond to an urban left over space situation. Native forbs are chosen that are aesthetical appealing and benefit biodiversity and pollinators. Inspiration to the gravel lawn comes from Biparadiset i Växsjö where a gravel-industry site was transformed into an ecological park.

In the establishment of the gravel lawn two different methods are proposed on the two different sites. In the area we call Park the top layer of soil will be removed and plug-in-plants will be planted in the already quite dry slope. The planting method is used to get a fast result in this area that is highly visible since it is located in between the library and the restaurant.. East of the park, in the area we call “left-over-space” we propose the top layer of soil be removed and a layer of crushed rock added. Maintenance of this area consists of the possible removal of unwanted weeds and mowing in September each year.

### ECOSYSTEM THINKING

Warm sandy hills are especially good for bees and other insects to nest in. In combination with a variety of flowering plants this sort of plantation enriches the biodiversity of flora and fauna as well as providing pollen for pollinators. The flowers chosen are also of high aesthetical value and the gravel lawn is proposed in areas that do not provide any cultural ecosystem services such as social relations or recreation.



*Lawn on sloping areas in urban situations is often difficult to maintain and require more water to look green and lush.*



*Lawn on sloping areas in urban situations is often difficult to maintain and require more water to look green and lush.*



alternative  
LAWNS  
GRAVEL LAWN



PLANT PROPSAL GRAVEL LAWN

1: PARK

2: LEFT-OVER-SPACE

Layout: seeding + plugging

Habitat: dry, sandy, sunny

*Achillea millefolium* (Rölleka)

*Armeria maritima* (Trift)

*Antennaria dioica* (Kattfot)

*Anthyllis vulneraria* (Getväpling)

*Dianthus deltoides* (Backnejlika)

*Galium verum* (Gulmåra)

*Hypochaeris radicata* (Rotfibbla)

*Jasione montana* (Blåmunkar)

*Lotus corniculatus* (Kärringtand)

*Lychnis viscaria* (Tjärblomster)

*Rumex acetosella* (Bergsyra)

*Saxifraga granulata* (Mandelblomma)

*Silene uniflora* (Strandglim)

*Plantago media* (Rödkämpar)

*Pulsatilla vulgaris* (Backsippa)

*Trifolium arvense* (Harklöver)

*Veronica spicata* (Axveronika)

*Veronica officinalis* (Ärenpris)

*alternative*  
**LAWNS**  
**GRAVEL LAWN**





*Herbaceous*  
**BORDER**  
**LAWN**





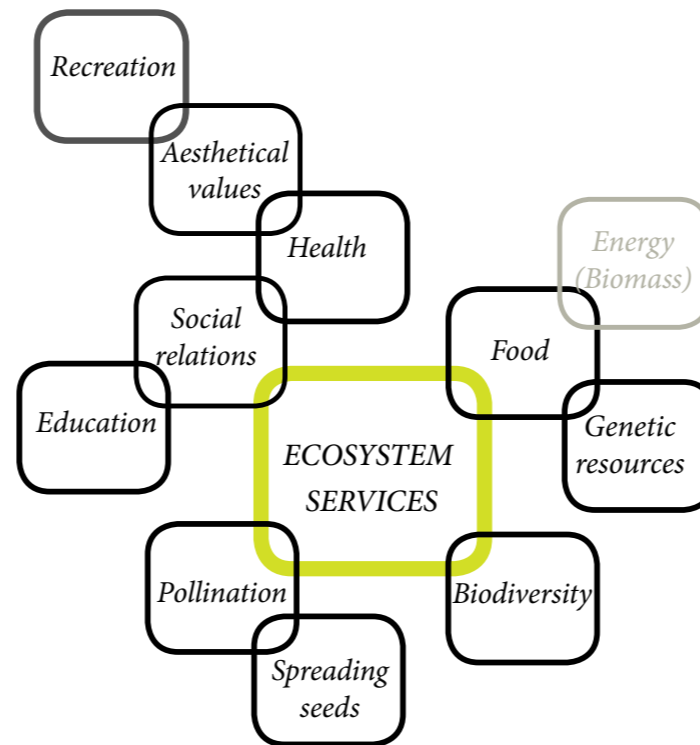
# alternative LAWNS

## Herbaceous BORDER LAWN (Blommande gräsmattekant)

In both gardens and courtyards lawns are important for social and aesthetical values. However in these situations it is usually not the whole lawn that is used for social activities and needs to resist wear. An alternative to reduce the amount of lawn, can be an Erbausious border lawn, with perennial native flowers that is laid out as a frame to the conventional lawn. For the chosen selection of plants the plantation requires to be in a sun exposed area. We found it suitable to establish a herbousious border lawn in the Courtyard at campus, this spot is partly sun exposed and protected from wind. For the plantation we have selected plants that live in dryer chalk rich soil and are of strong decorative character. Inspiration for the plantations has been taken from the Olympic Park, from Piet Odulfs plantations in Enköping as well as from landscape designer Peter Gaunitz prarie plantations in Alnarp and Laholm. For establishment the top layer of soil is removed and a layer of crushed concrete from example construction-sites are added. To get a faster establishment we suggest that plug plants are used in the demonstration trail where the proposed herbousuous border lawn is quite small. In another contexts, where the area is larger, seeding could also be used or a mix of the both methods. Maintenance is done by some manual weeding. To keep an aesthetic value even during wintertime the flowers are not cut down.

### ECOSYSTEM THINKING

The lawn plantation contains some plants that are edible and medicinal. Even more of these kinds of plants could be used if the plantation is placed in a garden or where someone will harvest them. The lawn-plantation can therefore be considered to provide ecosystem services in form of food and health. The lawn plantation is also aesthetically valuable and the variety of native species gives educational value. The flowers provide pollen for pollinators and the different plants contribute to increase the biodiversity and the genetic resources in the area. Where people get the possibility to interact with the lawn, by cutting, planting or harevesting both social relations can occur and studies have been showed that gardening increase human health.



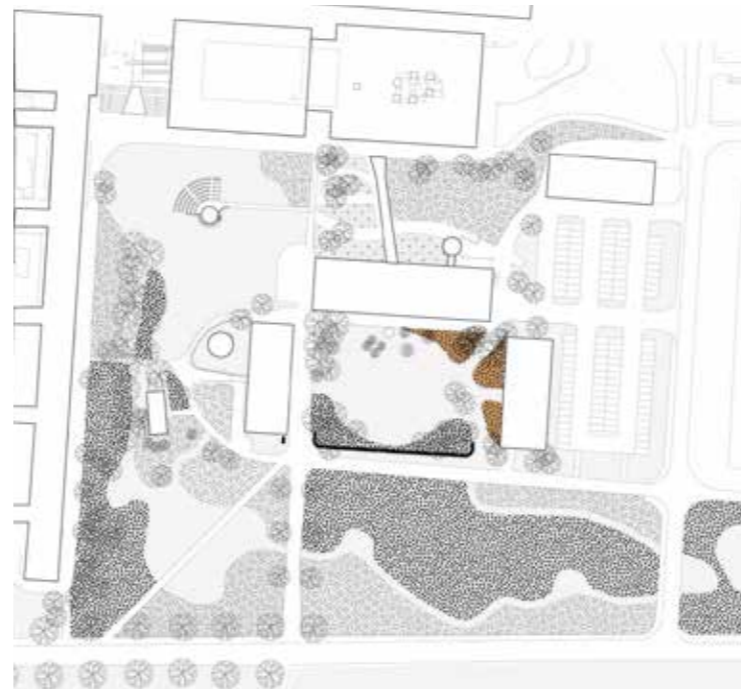
People that live in connection to courtyards often found it important that the lawns are well maintained and look nice.



On a courtyard in an urban area it is important to have some areal for social meetings and activities. Here an herbaceous broader lawn can be a decorative element.



*alternative*  
**LAWNS**  
*Herbaceous*  
**BORDER LAWN**



**PLANT PROPSAL**

**1: COURTYARD**

**Layout: seeding + plugging**

**Habitat: dry, sunny, chalksoil**

*Allium schoenoprasum* (Gröslök)

*Carum carvi* (Kummin)

*Cichorium intybus* (Cikoria)

*Dianthus deltoides* (Backnejlika)

*Echium vulgare* (Blåeld)

*Filipendula vulgaris* (Brudbröd)

*Fragaria viridis* (Backsmultron)

*Geranium sanguineum* (Blodnäva)

*Melica ciliata* (Grusslok)

*Origanum vulgare* (Kungsmynta)

*Scabiosa columbaria* (Fältvädd)

*Veronica spicata* (Axveronika)

*Thymus serpyllum* (Backtimjan)



# alternative LAWNS

## Herbaceous BORDER LAWN





*GRASS FREE  
LAWN*





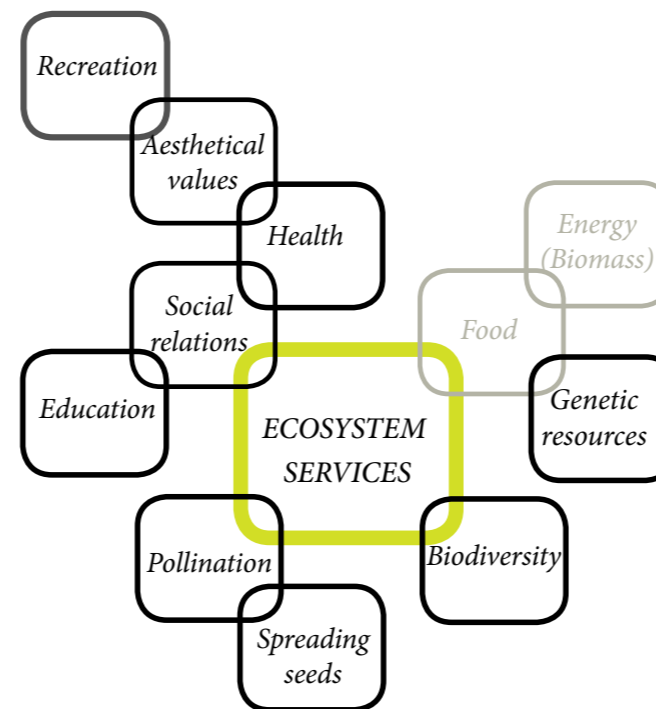
# alternative LAWNS

## GRASS FREE LAWN (Gräsfri gräsmatta)

Grass free lawn is a concept of a lawn that does not contain any grass species. Inspiration to this kind of lawn is taken from Lionel Smith at the University of Reading in UK. It is important to use a mix of short-fast growing and tall-slow growing plants. The different size of plants in combination with disturbance will create a species rich lawn. To keep a high biodiversity of the lawn it is important the continuation of disturbance favours the shorter plants. This is made by moving the lawn around four times per season with a normal lawn mower. To get the grass free lawn to establish well it is necessary to use pre-grown plug-in-plants that cover the ground quick and reduce the amount of weeding. A grass free lawn is a bit expensive to establish since a lot of forbs are needed to create a dense carpet. But when it is established it requires less maintenance than a conventional lawn. Considering the amount and care it takes to establish a grass free lawn it is most suitable in smaller parts as in a garden, courtyard or on small patches in an urban area that should be decorative. We suggest that the grass free lawn on site is placed close to the little house (Birgitta torpet) and will correspond to a garden.

### ECOSYSTEM THINKING

The grass free lawn has another aesthetic value in comparison to the conventional lawn since it has a large variation of flowers, texture and colours. The grass free lawn requires some wear, therefore it can be used for social activities such as recreation and social relations. Since the grass free lawn provides cultural ecosystem services it is well suited in a garden or courtyard. The grass free lawn contains of a high variety of plants which give biodiversity and its flowers also provides pollen for insects.



People in villas maintain their lawn often to follow the neighborhood unwritten social rules.



To reduce maintains and still have a garden that doesn't look to wild or messy, a grass free lawn can be a well suited alternative.



*alternative*  
**LAWNS**  
**GRASS FREE LAWN**



**PLANT PROPSAL**

**GARDEN**

**Layout: plugging**

**Habitat: normal moist soil, half shade to sunny**

- Achillea millefolium* (Röllika)
- Bellis perennis* (Tusensköna)
- Campanula rotundifolia* (Liten blåklocka)
- Fragaria vesca* (Smultron)
- Geranium pyrenaicum* Burm (Skuggnäva)
- Geum urbanum* (Nejlikrot)
- Lathyrus pratensis* (Gulvial)
- Leontodon autumnalis* (Höstfibbla)
- Lysimachia nummularia* (Peningblad)
- Lotus corniculatus* (Käringtand)
- Plantago major* (Groblad)
- Polygala amarella* Cr. (Rosettljunfrulin)
- Potentilla reptans* (Revfingerört)
- Primula veris* (Gullviva)
- Pilosella aurantiaca* F. W. Schultz & Sch. Bip (Rödfibbla)
- Prunella vulgaris* L. (Brunört)
- Ranunculus acris* (Smörblomma)
- Ranunculus repens* (Revränunkel)
- Trifolium hybridum* (Alsikeklöver)
- Trifolium repens* (Vitklöver)
- Viola canina* (Ängsviol)
- Viola odorata* (Luktviol)



*alternative*  
**LAWNS**  
**GRASS FREE LAWN**



*Grass Free Lawn*  
 Photo: Lionel Smith



*Grass Free Lawn*  
 Photo: Lionel Smith



*Prunella vulgaris*  
 Photo: Anna-Lena Anderberg



*Pilosella aurantiaca*  
 Photo: Arne Anderberg



*Bellis perennis*  
 Photo: Lionel Smith



*Viola odorata*  
 Photo: Anna-Lena Anderberg



*Ranunculus acris*  
 Photo: Arne Anderberg



*Geranium pyrenaicum* Burm.  
 Photo: Anna-Lena Anderberg



*Lysimachia nummularia*  
 Photo: Arne Anderberg



*Plantago major*  
 Photo: Lionel Smith



*SPONTANIOUS  
LAWN*





# alternative LAWNS

## SPONTANIOUS LAWN (Spontan gräsmatta)

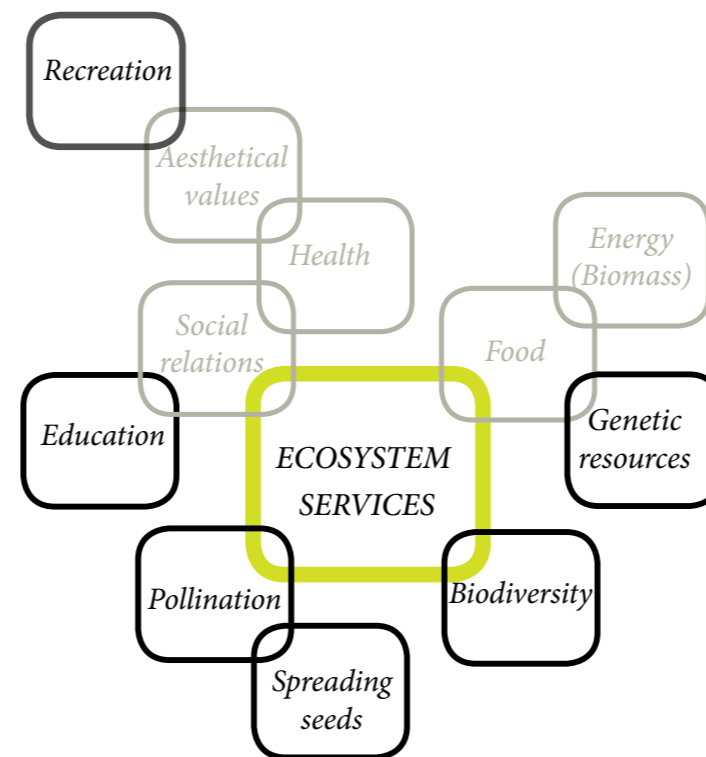
The spontaneous lawn is a smaller area with existing or prepared soil inside a strict frame. In this spot plants are left to establish from the seed bank or by seeds from the surrounding environment and the vegetation is let to grow wild. To get different aesthetical expression the spontaneous lawn can be cleared of higher vegetation such as tree seedlings once or twice a year.

In urban situations the conventional lawn is often used as a ground cover on small patches of greenery. These lawns require regular mowing, to decrease maintenance cost and increase biodiversity spontaneous lawn plantation can be an option.

By keeping the spontaneous vegetation in a well-designed frame it will not look too wild or messy to fit into an urban context. We have decided to place the spontaneous lawn in the spot that correspond to a Left over Space in an urban situation.

### ECOSYSTEM THINKING

The spontaneous lawn plantation on campus will work as an educational site where students can form and observe how the vegetation will develop. It is possible that social relations between students will develop when they work practical with vegetation together. It is difficult to know exactly what plants that will establish but most likely it will provide a higher biodiversity than a conventional lawn. It is also interesting from a spiritual way to look at a spontaneous “wilder” piece of vegetation in an urban context.



Smaller patches of grass are mainly providing aesthetical values and are often maintained to look neat.



At smaller patches in the city a spontaneous lawn could be implemented but requires to be framed in a nice way, in this example corten steel is used.



*alternative*  
**LAWNS**



*Spontainius vegetation aroound trees in Zurich.  
Photo: Ameli Hellner 2010.*



*Spontainious vegetation in Berlin.  
Photo: Maria Ignatieva, 2013.*



*Gravel as base in plantation, Zurich  
Photo: Ameli Hellner, 2010*



*Corten steel used to create a nice "frame". Bordeaux.  
Photo: Ameli Hellner, 2012.*



# alternative LAWNS

## The site as one EKOSYSTEM

If we look at the site as a whole ecosystem the new alternative lawns are adding more ecosystem services to the site as well as the existing lawn is kept in places to protect existing values.

All the different alternatives to lawns are providing educational services since it works as a test site for the research group, education and inspiration for students, professionals, stakeholders as well as the public. The site is now having a high genetic diversity since native flora that is not genetic modified are added to the site. The trail can provide recreational purposes either for people to walk around or spend time in the small rooms that also open ups for social relations. One important goal was to reduce maintenance and CO2 emission. The trial that consists of grass will still be cut frequently but the alternatives will be maintained less frequent from non to around four times a year. The site in its whole will have a reduced maintenance as well as CO2 emission. The harvest of the meadows can in the future be used for biomass for Uppsala municipality or SLU.

It is difficult to measure aesthetical values since it is quite subjective. However the site will now contain lots of flowers and have a dynamic aesthetical expression that change with the seasons. One of the main aims was to increase biodiversity, when the alternatives are established there will be a high diversity in flora and will possibly attract insects as well as smaller mammals.

### EXISTING ECOSYSTEM SERVICES AT THE SITE

1. Biodiversity and Pollen for pollinators
2. Recreation and Social Meetings
3. Biodiversity, pollen for pollinators and Education
4. Biodiversity and Education
5. Social relations and recreation
6. Biodiversity



### THE EXISTING ECOSYSTEM SERVICES AT THE NEW SITE

- 2, 5. Since these two spots are the most active in the area the ground cover require to resist a high amount of wear. The existing lawn is here kept to invite to social activities.
- 4, 3, 1. The species here are protected and plug plants planted to increase biodiversity with out removing top soil.





# FILM *visualisation & information*

*To be able to communicate the idea of the alternative lawns to a broader audience than the people normally visiting SLU, a short movie have been done that can easily be seen on youtube.*

## *A movie for inspiration*

The basic idea with the movie is to awaken an interest for sustainable alternative lawns. The movie shows design solutions that could be used instead of lawns in urban contexts as well as at the demonstration site at SLU. The basic reason for doing the short movie was that we wanted the idea of alternative lawns to be able to spread to people in general without that they had to read our thesis. We are hoping that the movie makes people curious about the demonstration site and might go there. The movie also gives a short background to the design and basic knowledge about lawns and alternative lawns which could be useful if one visits the demonstration site at SLU campus and do not have the thesis in their hand. The movie can easily be downloaded from YouTube.

We have produced pictures of mixed techniques with aquarelle and collage. In-between the pictures text has been added as short information. Sound has been used to create an extra feeling of what environment the picture are referring to.

## *THE STORY*

Act 1) Different urban situations are illustrated with a lawn mower and the sound of a lawn mower in the background. In the first act there are some information about conventional lawns and why they are not sustainable from an ecological perspective.

Act 2) An imaginary picture introduce the lawn trail at SLU Campus. Walking along the trail the viewer gets a glimpse of the different alternative lawns created in different habitats at SLU.

Act 3) In the last part of the movie we are back in an urban context and alternative solutions are shown instead of the conventional lawns.



# *DISCUSSION*



# DISCUSSION

## *Why is this subject is important?*

The aim with this thesis was to find inspirational alternatives to lawns that can be sustainable and increase ecosystem services in cities. This task is very timely since ecosystem services on earth are decreasing rapidly and the biodiversity loss is great. 70 percent of open space in urban areas in most of the world's cities is covered by lawn and at the moment these lawns provide mainly cultural ecosystem services (recreation and purely decorative). The replacement of the conventional lawn to more diverse alternatives can be a great investment for the future because it addresses current climate challenges and can be a good tool for recovering lost urban biodiversity. The high amount of lawns in urban areas is a global phenomenon, having at least 300 years of history and popularized widely in media. Humans cultural preference for lawned landscapes is not consistent with the way we generally tend to imagine our future resilient cities. We believe that many people have a difficult time to imagine and accept any alternatives to the conventional lawn. However it is crucial to go in depth of the "lawn" subject and establish practical examples of alternative lawns.

## *Challenges*

Considering today's trends for sustainable urban development the future looks promising for alternatives to lawns to be implemented in a bigger scale and become a common practice. However there are several factors that create challenges to reaching this goal of providing a more diverse urban landscape. Through this essay we have found three main challenges that can make implementation of alternatives difficult or delaying.

- There is a lack of information about the disadvantages of conventional lawns amongst the landscape architecture profession and amongst the public as well as politicians in general. As we looked into the subject we have found very little information about Swedish lawns and there is almost no information about lawns in relation to sustainability and ecosystem services. If lawns are mentioned in relation to ecosystem services it is often just in comparison with paved ground cover and are therefore seen as a sustainable alternative.
- Another challenge is the cultural preferences for lawns. Our Western society connects neatness directly with a "good" urban context while

higher and more diverse vegetation is perceived as something "wild" that should be kept outside the city borders. This general picture is then reinforced by media and market economy with a multibillion dollars lawn industry. The lawn has become such a common feature in the urban environment that it is difficult for people to imagine other alternatives or to accept that it is not "ecological" enough.

- The third challenge considers lack of long term planning and ecosystem thinking in the management sector of urban municipalities. This is a problem since alternative lawns require different types of maintenance than conventional lawns with the right balance between disturbance and stress. With a closer collaboration between the designers, planners and the greenspace management sector a more sustainable environment might be easier to achieve.

## *What is a lawn and what is an alternative lawn?*

During this process we had many discussions about what a lawn is, what an alternative lawn is and what an alternative to lawn is. What people usually means by "a lawn" is in most cases a green carpet of short cut grass. Therefore the Grass-free-lawns which is brought up in this essay is probably the alternative that is the most similar to such "classical" lawns since it consist of short vegetation that also can be cut by a lawn mower and can resist trampling. We were first thinking about searching for one alternative lawn, which would be a vegetative carpet with similar qualities and appearance to the grass-free-lawn. However when we looked at lawns in Uppsala we realized that it was not possible to refer to the lawn in urban situations as an object in itself, detached from its context. The lawns in urban environments have different purposes and alternatives could be adapted to their contexts. In some situations lawns provide social actives like in parks and recreational areas but in other places (traffic environments or on smaller "left over spaces") it provides mostly aesthetic values. However when we were thinking broadly about alternatives to lawns, we realized that this could be basically anything from low evergreen plantations to forest and asphalt. We then decided to focus on alternatives to something that could be compared with the conventional lawn. Based on the historical review and the general social perceptions of lawns the proposed alternative lawns can all be compared with a vegetative carpet which covers the ground.



# DISCUSSION

## *Did we answer the questions?*

The objective of this thesis was to investigate the phenomena of lawns in relation to ongoing research in Sweden and as a final product to propose a conceptual design for a demonstration trail of sustainable alternatives to lawns at SLU Campus.

We think the thesis achieved this goal since we have created eight different alternatives to lawns, that all could be studied and later established in the demonstration trail at SLU, Campus. All alternative solutions offer higher biodiversity. They also provide more pollen and require less frequent maintenance.

Compared to lawns these alternatives have a more dynamic aesthetical appearance. Through literature studies, case studies, our own experience as landscape architecture students and from discussions with the LAWN research group we argue for the importance to change the conventional lawn to sustainable alternatives.

It was difficult to find information specific about lawns in the Swedish culture but by analyzing Swedish landscape design history in general we could make conclusions about how the lawn had been used in Swedish landscape architecture and what cultural importance it had and has in modern society. The lawn today is very much an extension of the built environment and work as a carpet where it signals status, order and “care by humans”.

The most complex question to answer was “How designers can develop the lawn through ecosystem services thinking?” From the beginning we concluded that conventional lawns provides cultural ecosystem services but that other alternatives could provide services from a larger spectrum and therefore be more sustainable. However we were struggling to somehow evaluate ecosystem services of the conventional lawn and compare it with ecosystem services provided by alternative lawns. The main issue was that the conventional lawn most likely was seen as a sustainable alternative in an urban environment compared to paved ground cover. We realized that the lawn in many cases provides the same ecosystem services as the alternative lawn but in much lower capacity. The complexity is also connected to general understanding, valuating and measuring of ecosystem services itself which is not perfect and still in a developing phase. Since we did not have any specific data

from the field research of LAWN group yet we completed a general ecosystem evaluation based on the knowledge we have gained from literature and interview analysis.

As a result of this thesis we have a very clear picture that the urban area needs to be seen as a whole ecosystem and the conventional lawn as part of this. It is important that lawn (covering 70 percent of the open space in urban areas) is not only providing social ecosystem services. Today ecosystem thinking should be compulsory for landscape designers who can create alternatives to lawns that favor ecosystem services suitable to the site and make sure that the ground cover in urban areas can provide services from all four categories of ecosystem services: cultural, providing, regulating as well as supporting ecosystem.

## *How did the alternative lawns turn out?*

We ended up proposing eight alternatives to lawns that can be fitted into different urban contexts. The main goal of the proposed alternative lawns was to increase value of ecosystem services. Another important task of our design work was to find alternatives which can be aesthetical and culturally accepted by Swedish society.

*Pasture:* Pastures are one of the ancestors to today’s lawn. It was the ideal landscape in the English parks. Before the lawnmower was introduced animal grazing was a way to keep grass short. However in today’s urban environments pastures are rare but we believe that a reinsertion of pastures in certain amounts close to humans could have high social values. It is also an alternative that can enrich biodiversity of endangered species and decrease maintenance cost in the long run. There are some issues with keeping pasture in urban areas and somebody needs to be responsible for the animal’s health and security. But people are generally very positive to live close to animals and this is an actual topic in the city planning debate today.

*Meadow lawn:* Is developed from inspiration from the classical Swedish meadow. This is a cheap alternative to a lawn since it requires less maintenance and can be easily established by seeding. It can be composed in many ways and be very beneficial to biodiversity and pollination. The



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negative aspect of creating meadows in urban areas is that the areas will be less flexible in use and meadows in some cases are perceived as “messy” and “untidy” by the public. For this reasons it is of importance that the meadow will have a very high aesthetic appearance and will be placed in appropriate places which are not highly used for social activities such as active recreation and sports. Information about the benefits of meadows should also advantageously be communicated to the public to make them more accepted and appreciated.

*Pictorial lawn:* We decided to implement a pictorial lawn with inspiration from Olympic Park in London. Pictorial plantings were very successful and appreciated by the public and as a decorative alternative along motor and rail roads. The negative effect of the pictorial meadow is that it contains annual flowers which need to be reseeded every year. However when considering the amount of money that is usually put on planting annual exotic flowers in urban flowerbed in each Swedish city this could be seen as a good ecological and economically sustainable alternative.

*Grove lawn:* Looking at the city environments we realized that an alternative lawn also had to be worked out for shady situations. Inspiration to this proposal comes from the grove which is a bio-diverse environment with trees and a low ground cover of plants adapted to a shady habitat. Just like the Meadow lawn the Grove lawn does not allow sitting and playing on the ground but does instead have other values like natural beauty and high biodiversity which might anyway be more relevant for these kind of situations. Plus such grove lawns are more economically sustainable since it require less maintenance compared to conventional lawn.

*Gravel lawn:* Considering lawns that are implemented on hilly dry areas which have harsh establishment and maintenance conditions, we developed an alternative solution that can resist dry conditions and can have a special value for bees and wasps that nests here. This type is species rich and contributes to improving urban environment as well as demanding less maintenance.

*Herbaceous border lawn:* Has its roots in the prairie with more of a chalky soil. To make this economically sustainable crushed concrete and buildings could be used as a foundation soil. Species that grow in these conditions are highly decorative and its flowers are extremely valuable for pollinators. This particular type of alternative lawn cannot replace conventional lawn for social actives but it can be placed as a beautiful and species rich border to a conventional lawn next to buildings, in parks and gardens.

*Grass free lawn:* can be created by using different species placed tightly into a vegetative carpet that is low, bio-diverse and also can stand trampling. The Grass free lawn requires some mowing and is yet expensive to establish and is therefore an alternative that needs to merit its location. It is an option for private gardens or on smaller specific patches in urban areas. It is probably as status rewarding as a green and lush lawn but it has more ecological values compare to conventional lawns from a sustainability point of view.

*Spontaneous lawn:* More than any other alternatives this alternative shows the dynamic nature of the lawn plant community and is therefore in our opinion a bit “philosophical” or new conceptual thinking suggestion. The Spontaneous lawn is an experiment that will show the growing pattern in abandoned areas if it would be left alone. In opposite to a conventional constantly controlled lawn which is designed to be static, this lawn is “designed” to grow free. We were inspired by other European cities for example in France and Germany where spontaneous planting is a very common landscape design strategy. But considering the swedish peoples resistance to messy environments, we understand that this alternative has to be presented carefully and that is why we use Joan Nassauer’s “Cues to care” approach and introduce a special frame that will make our spontaneous lawns seem like intentionally designed plantation.

## Method

### Literature studies

We had first planned to finish the literature studies completely after six



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weeks and then start with the design but realized soon enough that it will not be possible. The design work and the literature studies had to be done in parallel since they were influencing each other. Finally the literature studies turned out to be an ongoing process where the writing text and design process have been carried out from the start to the very end.

The case studies were very useful since it worked to inspire us to our alternative solutions. It is possible that if we would have looked at other case studies the result of the design would have turned out differently. We have chosen to write about cases brought up in the research group since the demonstration site is connected to their research. It was of course also helpful to choose these cases since we personally were able to meet and talk to the designers-authors of our case studies (James Hitchmough, Inger Runesson and Lionel Smith).

## *Inventory*

One of us knew the site very well from studying there for several years. This was helpful in the design process since we had a clear view of how people use the site, where they walk, sit and where the social hot spots are. This experience helped us to identify important ecosystem services. Work with the thesis was done during the autumn and it was perhaps a little bit of a disadvantage for all kind of inventories and observations we completed since people spend less time outdoors at this time of year. We see that we could have done an extended analyze of the vegetation on the site, which could have been helpful for the selection of plants for the alternative lawns but this was realized a bit too late in the autumn.

## *Design*

When we now look back at the work we have done we see other ways of approaching the design of the trail. One way could have been more focus on detailed design of a trail such as signs and benches. But since we concentrated on connecting the site to an urban context we focused on finding alternative lawns that could work in an urban context and be displayed at SLU. Since the conventional lawn itself is strict and non-dynamic we aimed for a design that was free and dynamic. The lawn trail is shaped and kept in shape by lawn mower that cut the trail short compared to surrounding vegetation. This can be a bit challenging in

the beginning but we have seen references on this and believe that it is possible to implement. It also gives future possibilities to change the shape of the trail if desired.

## *Visualizations*

The visualization was important in this project since we wanted to reach a broader audience rather than just visitors at SLU. Therefore we created a inspirational stop motion movie. The result is more of a conceptual thinking about conventional lawns and possible alternative lawns. The movie is supposed to help people imagine and accept an urban environment with less lawn. We did not aim to create a detailed information guide on how to create the alternatives.

## *Collaboration with the research group*

It's been very helpful for us to collaborate with the LAWN research group. Through meetings we got the chance to participate in many interesting discussions about lawns and alternatives to lawns. During the project we have been struggling to find the right balance between being visionary and realistic which have resulted in a design that might be a bit more conceptual than what the research-group had expected. However we are happy to have come up with ideas of how one could make this demonstration site that reaches out to a broader audience and can build bridges between research and landscape design.



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