

Movium Fakta # 3 2022



PLAY BIOTOPES – WHERE BOTH CHILDREN AND NATURE THRIVE

Is it possible to combine children's need for contact with nature with the needs of different species of animal and plant, so that the result is a sustainable playground and a sustainable, highly biodiverse habitat?

Fredrika Mårtensson, Anna Litsmark, Björn Wiström, Marcus Hedblom & Åsa Ode Sang

The sustainable playground

Children are fascinated by the things living and moving in nature. Highly biodiverse environments stimulate play while contributing to social and ecological sustainability.

We are living in the Anthropocene, an era when human activity is depleting ecosystems and changing the climate. It is becoming increasingly urgent to find solutions that meet our human needs while respecting the planet's limitations.

Today, there are many advocates for multifunctional spaces that actively attempt to reconcile conflicting goals and identify synergies between diverse interests. The objective is sustainable land use that creates, develops and protects highly biodiverse ecosystems that contribute to the well-being of humans and other species.

Documented health benefits

For many years now, researchers at the Swedish University of Agricultural Sciences (SLU) have documented the health benefits of providing children with access to green and varied outdoor environments and championed biotope-based design modelled on natural and cultural landscapes. What is new is the combination of environmental psychology with the biotope focus to facilitate the transition to play environments based on nature. The aim is to create more naturalistic and process-oriented planning, design and management, based on the question: How can children's need for contact with nature be combined with the needs of other species of animal and plant in children's outdoor environments?

The day-to-day opportunities afforded children to spend time in nature are important to their development and health, both in the short and long term. These affordances encourage play and health-promoting physical activity. They also improve concentration and help children sleep through the night. Furthermore, green environments stimulate imagination, problem solving and the social climate in groups of children.

Artificial materials

Paradoxically, we are seeing an increase in artificial materials such as climbing frames, fences and rubber mats in children's outdoor environments. This creates separation between children and nature. In the book *Plats för lek: Svenska lekplatser förr och nu* [Places to Play: Swedish Playgrounds Past and Present] (2016), SLU researcher Märit Jansson advocates for "the sustainable playground" as the ideal; places that to a large extent rely on the site's natural attributes and materials.

How good various types of nature-based playground are at creating encounters between children and nature remains to be explored. Many so-called nature-inspired playgrounds have minimal biodiversity.

The question is, is it possible to preserve complex, highly biodiverse ecosystems while developing them into everyday environments for children? And to what extent can we achieve a more general transformation of children's outdoor environments so that they function on nature's own terms?

Important arenas

Children's outdoor environments are important arenas for physical activity and must be able to tolerate their play and activity. This requires a large enough area with robust vegetation. Aside from physical activity, there are also other important aspects of children's relationships with nature that a highly biodiverse landscape can offer in terms of variation, richness and complexity.

Children are fascinated by natural phenomena, by what is living and moving, and if they feel secure they will explore their surroundings. Nature's complexity creates situations that invite children to utilise their entire meaning-making repertoire using the body, senses and movement, as well as stimulating their imaginations. In her doctoral dissertation *The Landscape in Children's Play: A Study of Outdoor Play in Preschools* (2004), Fredrika Mårtensson writes about children's place based, zestful movement as play emerges from the physical exploration of their surroundings, creating relationships between places that contributes adventure to their play.

Developing a caring attitude

When children immerse themselves in nature with all their senses, various situations are created in which they can develop a caring attitude towards nature and its inhabitants. Children's playfulness in relation to their surroundings is their introduction to nature, an encounter that may develop into a more enduring relationship. A tree, a bush or an animal can become a central figure in a child's life. However, not every type of outdoor environment gives rise to an enduring relationship between child and nature; it requires the right place. This is where the term play biotope comes in.

Affordances is a term used to describe things in nature that allow us to meet our needs, in this case the need of children to explore their physical surroundings and to play. From this viewpoint, elements of natural surroundings might well be interchangeable with playground equipment and other artefacts. The term play biotope, on the other hand, refers specifically to nature's potential as a play environment.

A place to play

The word biotope originates from the Greek *bios*, life, and *tópos*, place; it refers to a small area that supports its own distinctive community of organisms. Hence a play biotope is a place for play that simultaneously provides a functioning habitat for other organisms. The children that play and learn in such an outdoor environment are part of its ecosystem.

For our purposes, the term play biotope is a pedagogical concept for the design of more natural play environments. It is a metaphor for taking natural local conditions as a point of departure and drawing inspiration from nature. When designing a play biotope, there is an attempt to systematically incorporate knowledge of ecosystems into creating more interesting places and greater biodiversity. The ambition of a play biotope is to create a place that meets children's needs on nature's terms.



Children like to climb trees. In the Climbing Edge at the Alnarp Landscape Lab, encouraging the growth of branches close to ground level ensures that children can climb the trees. Photo: Lars Brundin

Play on nature's terms

Play biotopes are shaped in landscapes that benefit children's play and motion. At the same time, the spirit of nature conservation must be observed.

Sports science researcher Ingunn Fjørtoft has studied the utility of natural environments for children's motor skills development. In Professor Fjørtoft's research, the term play biotope is viewed from a landscape ecology perspective, with the focus on how landscapes and ecosystems develop in relation to different species populations over time and space.

This approach highlights the structure and composition of the landscape, with attention directed towards processes resulting in changes of patterns. In such a description, the activities of children represent one layer of processes. A play biotope consists of the specific vegetation and terrain, with

different shapes, densities, sizes and variations that create the conditions for a specific play context.

Playing in natural surroundings

A given biotope – such as a wetland or forest edge – may contain diverse habitats that provide various species with the resources they need to survive. In each habitat there are spatial niches, i.e., places specifically suited to a species in terms of temperature, food supply and vegetation. Fjørtoft applies this terminology to research data concerning how children use natural surroundings while playing.

She describes how a tree biotope contains niches for treehouses and climbing, how a bush biotope contains niches for hide-and-seek and dens, and how formations of trees and bushes and the character of a place form habitats for specific games.

A place with a layer of bushes and trees and moderate changes in terrain is described as a habitat for both hide-and-seek and role play, while another with plentiful pines and pinecones becomes a habitat for throwing of pinecones.



Children's play and movement evolves in relation to the structures and elements of a landscape. Straight lines and well-defined borders make it more likely that their play turns into more competitive games. Photo: Lars Brundin

Paths for movement

Fjørtoft also demonstrates how different configurations of vegetation and topography acquire signal value in children's play and form paths for the children's movement through the environment. A straight line of bushes across flat terrain creates a barrier, while a more diffuse and curved edge line makes it easier for the children to cross a border between two different types of vegetation.

Together with children and conservationists, Fjørtoft and her colleagues are studying how the design of active play environments can be made compatible with the demands of nature conservation. A biotope in a Japanese school playground laid out between 2002 and 2014 includes overlapping layers of habitats for play, learning, water management and vegetation, with the aim of linking the different habitats and creating new dispersal corridors for flora and fauna.

The plan was that the overlap between the various functions for children, animals and plants would contribute to ecological complexity, thus

benefitting the children's learning and the play value of the site. Once completed, researchers counted as many as 186 play functions in the restored school playground environment.

This example also demonstrates the challenges involved in developing a play environment with conservation ambitions. Organisms living in the biotope may require corridors to similar nearby biotopes to which children do not have access.

Conflicts may also arise between children and nature. A small island in a stream was home to ducks and herons. The children found it amusing to jump across to the island, eventually wearing down the grass. The animals disappeared, upsetting the children who, after discussing the matter between themselves, decided to put the island off limits. The grass grew back and both the birds and several other animals returned to the island. This demonstrates that, when children have the chance to enjoy nature experiences that interest and engage them, a play culture can evolve that is responsive to nature.



Nature is rich in loose materials that provide a basis for children's play. Rotting logs are important to animal life and are also light enough for even the youngest child to carry. Photo: Lars Brundin

Encounters between play and the landscape

Practical and conceptual development of play biotopes is currently underway in a collaboration between landscape architecture bureau Urbio, Örebro Municipality and researchers at a number of Swedish universities.

The development of play biotopes is presented in guidelines titled *Lekotoper, lekvärde i naturlika gröna leklandskap* [Play Biotopes: Play Value in Naturalistic Green Landscapes]. Here, the concept of play biotopes is used as part of a strategy for creating richer play environments, with the emphasis shifted from playground equipment designed for motor exercises to encounters with nature in play landscapes.

The point of departure is the landscape architect's understanding of the flow and multidimensional nature of play. Children shape places to explore, experiment and create, as well as seeking out environments in which they can stage and process various imaginary situations.

The restricted role of outdoor play in children's day-to-day lives demands clear invitations to play addressed to the adults who decide when, where and how children are allowed to play. This requires not only a playground that signals that children are welcome, but also more specific design details that ensure that the site functions as part of children's social lives.

Multiple challenges

The lack of loose material and enclosures in play environments is problematised. While the objective is appealing nature-based playgrounds presenting multiple challenges, one must also take into account what different choices imply in terms of ecosystem services.

The point of departure for working with play biotopes is the unique conditions of the site and nature's possibilities to provide inspiration and guidance. The project describes the ways in which nature affords children rich sensory perceptions and materials they can use in their games. Using soil and rock and

vegetation as space-creating elements in an overall structure is key to the working method. Various artefacts relating to a theme may be used to reinforce play value, for example, buckets and pumps beside a stream, but even artworks and insect hotels.

Formulating play value

In this context, a play biotope is an interface between child and place applied to specific sections of landscape where the play values of the site are defined. The guidelines include play biotopes for forest landscapes – such as the Running Ridge, the Play Thicket and the Stick Forest – and for wetland landscapes – such as The Play Stream, the Rock Stream and the Play Pond. Seven principles have been developed for the design of play biotopes (see fact box on page 8).

Attempts are underway at SLU to further develop the concept of play biotopes in order to add nuance to the question of what synergies exist between children's need for contact with nature and the needs of the animal and plant kingdom, and how these interests can be combined.

Landscaping

Work is being conducted on play biotopes on school playgrounds, in public play environments and at the Alnarp Landscape Laboratory. School playgrounds have been landscaped to support play during breaktimes and in teaching. Various prototype play biotopes developed by landscape architects and municipal planners in dialogue with researchers studying urban vegetation, environmental psychology, ecology and interaction design are being trialled.

One vital detail is that the designs are being fine-tuned on site. A group of children has also tested the sites during the process.

Studying sites

The Alnarp Landscape Laboratory is a 20-hectare facility for studying complex issues related to the use, design and management of outdoor environments. This work requires observations of processes over a long period of time.

The relationships at and between different sites in the facility are studied, including the conditions for different species. In parallel, researchers

also study how well the environment works for visiting children. The goal is to find ways to reinforce the capacity of natural surroundings to support children's play and learning, with the emphasis on biodiversity and ecological adaption.

The work with play biotopes is one of several different attempts to firmly incorporate nature into children's everyday lives to make interesting encounters with nature possible. The vegetation that grows locally to children is often depleted, species-poor and contact with the surrounding landscape is lacking. In such a situation, it is easy to think that playground equipment and similar "eye candy" is the solution to activating children.

Invitation to play

In the ambition to make nature attractive to children there is a risk that children's play turns repetitive and nature encounters more unlikely. The challenge is to plan, develop and manage sites that invite children to play without artificial

artefacts taking over. With play biotopes, the aim is to begin with nature and build on children's opportunities for interesting encounters with the landscape, plants, animals and other natural phenomena on a given site.

The realisation of large-scale, nature-based play environments raises a number of questions about their design and management, questions that lack simple answers and demand modifications to working methods. It may be a matter of identifying sites with natural characteristics that are suited to play and developing and managing those attributes, or a more experimental approach to nature's complexity and children's needs, so that we can create new types of play habitat.

The ambition is to create play biotopes with play habitats that contain many different niches for children's play and activities and good living conditions for animals and plants. The role of the play biotope in urban planning should be as indisputable as that of the traditional playground.



The landscape in play: Here, children can rush up the hill to see what is on the other side. Moving towards unknown surroundings makes outdoor play an adventure. Photo: Anna Litsmark

Fact box

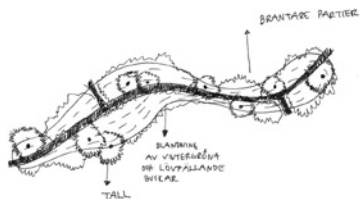
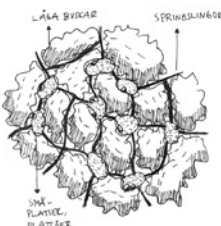
Seven things to consider when developing play biotopes

1. Landscape elements such as terrain, rocky outcrops, soil and water create variation between open spaces and topography with valleys and ridges.
2. Space-dividing elements are primarily natural, such as bushes and trees that create smaller, characterful rooms with “walls” and “ceilings” of branches and leaves. Boulders and rocks also make a contribution.
3. Natural materials such as water, sand, clay and gravel, and vegetation such as leaves, sticks, flowers, berries, pinecones, acorns and fruits. Loose materials that permit co-creation.
4. Playground equipment such as swings, slides, playhouses, water channels and pumps reinforce play, as do artworks and other features such as insect hotels and dead wood. Buckets and spades also add something.
5. Different types of spaces, such as enclosed spaces with dense walls and limited views in, more transparent spaces with sparse or low walls, or open spaces with low vegetation. Both naturalistic and structural elements can help to create clearly demarcated spaces.
6. Character and atmosphere, for example, dramatic and breathtaking, mysterious and exciting, snug and cosy, festive and fast-paced. The sensual and calm or the wild and exciting.
7. Rich and detailed design with a wealth of variation that is visually interesting and presents motor-skill, tactile and sensory challenges.

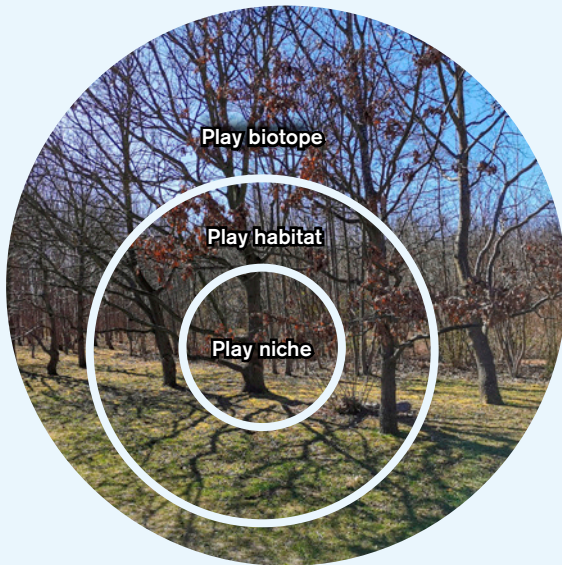
Beckman, Simonsson & Eriksson, 2022

Design principles for the Running Ridge play biotope

The Running Ridge is a concept describing children’s movement patterns in and around a collection of verdant ridges and valleys. It is designed as a series of undulating ridges that encourage running games and speed. By varying the height along the ridges and creating microtopography along paths, the circuit becomes exciting to move along. The Running Ridge varies in height and can have both steep and gentle slopes. A slide is a good way to add play value, as are climbing ropes or log stairs. The density and height of vegetation on ridges can be varied by the choice of plants. In certain places, green spaces can be created for more relaxed play – perhaps a small crawl-in space or larger arbour. The following examples show how the Running Ridge can be adapted to different topographies, path densities and spaces.



Beckman, Simonsson & Eriksson, 2022
Illustration: Elise Eriksson



- **Play biotope** – an area with specific conditions conducive to many different kinds of play and activities, such as the Climbing Edge.
- **Play habitat** – a demarcated area in which certain kinds of play are encouraged, such as rows of oaks that children can climb together during pretend play and conversation.
- **Play niche** – a space for a specific play activity, such as a specific tree with few branches where individual children can play undisturbed.

Figure: Anna Litsmark

Play biotopes are developed in the Landscape Lab

Attempts are underway at SLU to further develop the concept of play biotopes in order to add nuance to the question of what synergies exist between children’s need for contact with nature and the needs of the animal and plant kingdom, and whether these interests can be combined.

In the northeast corner of the Alnarp Landscape Lab at SLU, there is an area planted with rowan and whitebeam that, due to soil exhaustion, poor growth and invasive grasses, never grew into the forest it was intended to be. Despite these conditions, a number of trees did eventually succeed in establishing themselves to form wooded grassland with a variety of bushes, including rose, blueberry and hawthorn. Adjacent to this area, a small hill has been created with soil from the clearing of nearby ditches. The pioneer species willow dominates, but there is also a course herb

layer that was previously dormant in the soil. Today, this “failed” landscape is considered an important habitat for many insects.

To prevent the successive densification into woodland, the area has been repeatedly cleared. Ten years ago, a network of mowed passages was created as a maze for children. This has since been adapted to how people move through the area. Adjacent to the grassland, there is a row of oaks surrounded by pioneer, herblike vegetation. The low vegetation among the rowans and whitebeams initially provided the space for the oaks to sprout low branches. Thinning, pruning and clearing of nearby vegetation has allowed the low branches of the crowns of the light-demanding oaks to spread. Ropes have been attached to the oaks and colourful benches installed.

Popular destination

The Climbing Edge play biotope has become a popular destination for groups of children visiting the laboratory. With their high and low branches, the trees create a niche for climbing, clinging, swinging and hanging. The robust branches of the oaks present many challenges to

the children, allowing them to test their balance, hang and dangle, test how far they can climb out onto a branch, swing up and down and climb high up into the tree. Trees with many branches at varying levels and sticking out in various directions encourage many children to climb simultaneously. Trees with fewer branches invite children to sit each on their own branch and chat undisturbed. The two ropes can be used to cross from one tree to the next.

On one side of the Climbing Edge there is an open rectangle of farmland, beyond which are railway tracks where trains occasionally pass. This is another clear invitation to play. Children jump down from their trees to watch the trains. They cover their ears or scream in excitement, arms aloft as the trains roll by. This sometimes develops into a footrace along the edge of the field. For the children, the straight edge of the field, the line of trees and the speeding train are an invitation to compete. Lying on the ground are acorns, sticks, shells, stones and a herbaceous layer of wild strawberry and speedwell; this is a niche for exploration, gathering, creation and encounters with insects.

Tranquil backdrop

On the other side of the row of trees is semi-open grassland that provides a tranquil backdrop to climbing without casting shade on the trees. This area is not used to any great extent by the children, despite having a number of attributes that support pretend play. We attempted to crack the code of the dynamics of play between the various niches of activity in the area: Did thorns keep the children out? Is there too much scrub? In an effort to encourage children's play, new paths were created from the forest edge towards the small hill, some thorny bushes were removed, loose branches were collected in piles, rudimentary dens were created, as well as new climbing trees.

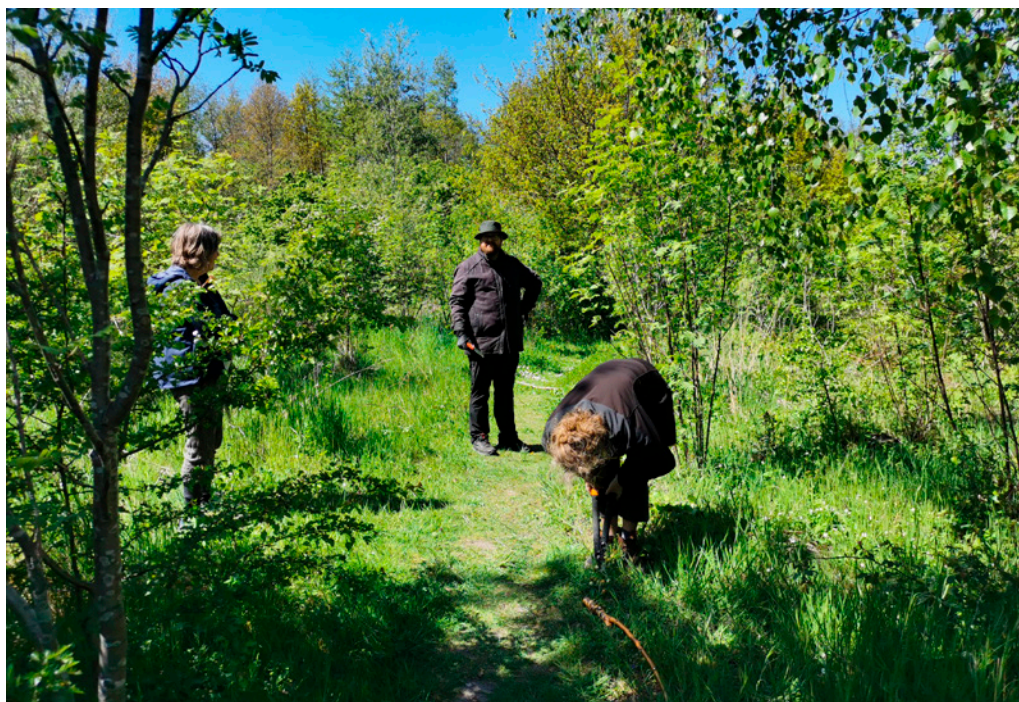
The line of climbable trees is in itself a distinct habitat for play that the children seek out. The question is, which values related to children's play and ecology, can be combined in this semi-open landscape of grassland and thickets to form a play biotope? Perhaps earlier forms of maintenance can offer guidance; for example, coppicing, a strategy in which corridors of meadow are alternated with copses of trees and bushes. The task of developing play biotopes as an alternative to traditional playgrounds continues.



In the Climbing Edge at the Alnarp Landscape Lab, encouraging the growth of branches close to ground level ensures that children can climb the trees. Photo: Anna Litsmark



The Climbing Edge is a distinct play biotope at the Alnarp Landscape Laboratory. It has different niches for play at different times of the year. A handful of benches provide a base for educational activities. Photo: Anna Litsmark



To further develop the play biotope, the area is cleared, creating new paths, climbing trees and loose materials. Working in the Climbing Edge, from left to right: Fredrika Mårtensson, Björn Wiström and Jitka Lindén. Photo: Anna Litsmark

Further reading

Ito, K, Tomomi S, Fjørtoft I (2016). "Ecological design: Collaborative landscape Design with School children".

In, Ann Marie F. Murnaghan and Laura J. Shillington (eds.). *Children, Nature, Cities*, Chapter: Ecological design: Collaborative landscape design with school children, Routledge.

Fjørtoft, I (2012). *Barnas lekebiotoper – ett landskapsøkologiskt perspektiv på barns bruk av uteområder*.

I Krogstad, A, Hansen GK, Høyland, K, Moser, T (eds.) *Rom for barnehage. Flerfaglige perspektiv på barnehagens fysiske miljø*. Bergen: Vigmostad och Björke AS.

Jansson, M, Ahlko, Å, Norén-Björn, E, Nolin, C, Bucht, E, Bodelius, S, Kristensson, E, Prellwitz, M, Berglund, U (2016). *Plats för lek - Svenska lekplatser förr och nu*. Svensk Byggtjänst.

Mårtensson, F, Johansson, M, Litsmark, A, Stroh, E, Thelin, L (2021). *Barns kontakt med djur i vardagen – en forskningsbaserad syntes*. Department of People and Society, Swedish University of Agricultural Sciences. SLU Future One Health report no. 1.

Mårtensson, F, Litsmark A, Wiström, B, Hedblom, M & Ode Sang, Å (2021). *Utveckling av lekotoper för barns naturmöten*, Faculty of Landscape Architecture, Horticulture and Crop Production Sciences, Swedish University of Agricultural Sciences. (Report 2021:2).

Beckman, M, Simonsson, E & Eriksson, E, (2022 digital publication). *Vägledning Lekotoper - lekvärde i naturlika gröna landskap*. Urbio and Örebro University. The report can be downloaded from the KTH Royal University of Technology website Digital and Physical Play Environments at <https://digifys.csc.kth.se/>.

About the authors

Fredrika Mårtensson, environmental psychology at SLU's department of People and Society; with Anna Litsmark of the same department and a doctoral student at Lund University; Björn Wiström and Åsa Ode Sang of SLU's department of Landscape Architecture, Planning and Management; and Marcus Hedblom of the department of Urban and Rural Development at SLU.

The project Developing Play Biotopes in Practice and Theory is part of the EU project Regreen at SLU, the Vinnova project Sustainable Urban Play Environments (project manager Eva-Lotta Sallnäs Pysander) and the Movium Partnership in a collaboration between SLU, Örebro Municipality and Urbio.

Cover photo:

Photo: Lars Brundin

All photographs were taken at the Alnarp Landscape Laboratory.



MOVIUM
THINK TANK

