

## Original article

## Characteristics of forest sites used by a Danish forest preschool



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## ABSTRACT

Outdoor stays in green settings are regarded as beneficial for preschoolers, but not much is known about the characteristics of the sites that are chosen and used by outdoor preschools, the so-called 'forest sites'. Therefore, this paper investigates the characteristics and use of forest sites in a Danish forest preschool and the activities and features in use during time for child-initiated activities.

Staff and children (approx. 3–6.5 years) walked to a forest site and stayed for 2–5 h on a daily basis. Fifteen forest sites were observed in school hours at 24 stays during one year. This was supplemented by short interviews and informal talks with children and staff to learn more about the forest sites. The findings were organised according to the following ten classes of outdoor features: Open Ground, Sloping Terrain, Shielded Places, Rigid Fixtures, Moving Fixtures, Loose Objects, Loose Material, Water, Creatures and Fire.

Most forest sites were glades or pillar halls, often situated at the intersection between different plantings. Staff avoided locations near deep water bodies with steep sides, but at most sites open water was either available at the site or nearby. The daily choice of forest site was connected to the location and features of the site, as well as the weather and season, the actual group of children, and the level of staffing. Children and staff opinion on sites often coincided. Children used features from all classes, but 'loose objects' were most often referred to in the interviews. Children as well as staff valued 'shielded places', but for staff this was only to a certain degree, since surveillance was important.

It is suggested that the results, although derived from a single case, may inspire design and management of green spaces and forest in relation to preschools.

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## 1. Introduction

A growing number of children spend their weekdays in institutional care. In Denmark, 97% of the children aged 3 to 5 attend preschool (Danmarks.Statistik, 2013). Children start formal schooling in August the calendar year they turn 6. Since children spend so much time away from home, many decisions about children's outdoor life are taken by the preschools. Most preschool children in Denmark spend a considerable amount of time each day in outdoor settings next to the preschool premises. These settings are most often designed and contain play equipment.

Studies about children's outdoor behaviour show that children select places that offer opportunities for various activities (Mårtensson, 2004; Moore, 2014), seek hiding places (Gitz-Johansen et al., 2001; Kirkby, 1989; Herrington and Studtmann,

1998; Kylin, 2004), are attracted to specific features such as play equipment, a pair of large stones, a particular tree, a spot between shrubs or a location with a good view (Mårtensson, 2004), or a ditch (Lerstrup and Møller, in press); children often seek thrilling and risky activities (Sandseter, 2009), and are inspired by loose parts and natural elements (Herrington and Studtmann, 1998; Kylin, 2004; Laaksoharju et al., 2012; Kylin, 2003). When older children aged 7–11 were asked about outdoor areas, they expressed an interest in 'fun', 'a lot to do', and 'lots of things', and natural elements as well as the play equipment were valued (Jansson, 2008). Children aged 9–13 who were interviewed while walking often pointed out dens and loose objects for den-building as important (Kylin, 2003).

Research indicates that the design of preschool outdoor spaces has an impact on children's activities and health (Cosco, 2006; Boldemann et al., 2011; Söderström et al., 2013) and that spending time in green outdoor settings is healthy and educational for preschool children (Grahm et al., 1997; Kiener, 2004, 2009; Vigsø and Nielsen, 2006; Fjørtoft, 2001; O'Brien, 2009; O'Brien and Murray, 2007; Fjørtoft and Sageie, 2000).

Some preschools in Denmark have a tradition for outdoor stays in green settings as an essential part of daily life, the

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so-called outdoor preschools, including forest preschools, nature preschools, commuter preschools and bus preschools. These kinds of preschools are not standardised and the names are not used consistently, but they share a practice with extensive outdoor stay in natural or semi-natural settings regardless of weather and season. Usually, forest and nature preschools stay in forest and natural areas nearby, commuter preschools travel from the city to a house in green settings, and bus preschools go by bus to different sites in the surroundings, often green settings. Commuter preschools are considered to be a Danish invention (Lysklett, 2013). Jointly the outdoor preschools represent a wide range of ways to organize the outdoor stays regarding choice of outdoor sites and frequency and length of stay.

For more children and preschools, especially in urban areas, to benefit from the potentials of nearby forests and green spaces, these could be planned, designed and managed to better suit their needs. Hence, children's and staff members' experiences of using forests settings in an existing forest preschool and a close study of the used sites and features might be informative. The research question is as follows: *What are the characteristics of forest sites used and valued by children and staff in preschool, exemplified by the study of a specific Danish forest preschool?*

### 1.1. Theoretical framework

To understand the properties of the studied forest sites, the theoretical concept of *affordances* developed by Gibson (1979) within the field of ecological psychology was chosen. Gibson coined the term 'affordances': "The *affordances* of the environment are what it *affords* the animal, what it *provides* or *furnishes*, either for good or ill." (Gibson, 1979, 127). The affordances of a setting exist in relation to a person or a group of persons and their sizes, abilities and interests. The concept highlights the close and dynamic relationships between the environment, the users, and their actions. In this study, affordances refer to *the meaningful action possibilities of the environment*. In focus are the activities offered by the setting, and the features offering the activities, i.e. the *affording features*.

Affordances defined as functional significances of environmental features were the outset for a functional taxonomy of children's outdoor environments by Heft (1988). Based on observations of pre-schoolers in a playground and forest settings for two months in winter/early spring, the taxonomy was modified for children in preschool (Lerstrup and van den Bosch, 2016). The result was a classification of outdoor features for children in preschools with ten classes: *Open Ground, Sloping Terrain, Shielded Places, Rigid Fixtures, Moving Fixtures, Loose Objects, Loose Material, Water, Creatures and Fire*. Each class was specified by key activities based on analysis of the observations. The key activities were the activities observed to be distinctive for the class and attractive for children in preschool. Within each class, the features that made the key activities possible were considered to be *affording* for children in preschool. The classes were created to get an overview and not to suggest that features from the classes should be kept apart in different sub-settings (ibid.). The mentioned classification of outdoor features is used to structure the data in this study.

The definitions used in this study are presented in Box 1 below.

## 2. Methods

A field study was carried out with a group of 21 children aged approx. 3–6.5 and three staff members in a forest preschool. The preschool was chosen because it used many forest sites and was conveniently located. On average 4 out of 5 days a week in all seasons the 21 children walked to a forest site accompanied by 2–3 staff members for a stay of 2–5 h per stay. The forest sites were not

### Box 1: Definitions in this study.

Affordances	The meaningful action possibilities of the environment
Affording features	The specific features that afford the meaningful activities
Fixtures	Fixed objects such as trees, shrubs, boulders, logs, bridges
Forest features	Outdoor features, that are not or only subtly manufactured such as plants, creatures, ditches, saw dust, water bodies
Forest preschools	Preschools where stays in forest sites play an essential role in daily life
Forest sites	Sites in public accessible green settings used for preschool stays, often named
Green settings	Outdoor settings where forest features are perceived as dominant; including natural, semi-natural and cultivated areas
Playgrounds	Areas planned and designed for children's play, mainly with manufactured play equipment
Shielded Places	Places and structures where children can be fully or partly shielded from view and intrusion

designed with preschools in mind, but were chosen by the staff as suitable sites among a vast number of possible places in the forest as explained later. The forest preschool was located on the edge of Sorø, a small town 80 km west of Copenhagen, Denmark. The preschool premises were located close to the forest edge. The forest was open to the public, owned by a foundation and was primarily used for wood production.

The characteristics of sites from an affordance perspective were identified by observing sites, activities and features in use in child-initiated activities and by interviewing users in situ and in retrospect, a method for investigation of affordances described by Heft and Kyttä (2006). The observations of activities and used features in child-initiated activities were interpreted as children's non-verbal responses to a question about affordances: *meaningful actions and affording features in the setting*. The study consisted of the following steps:

- 1) The group of 21 children was observed for 1–2 h during times for free play in the forest. Throughout 2011, 24 stays with observations were conducted at 15 different forest sites; some sites were visited more than once. The activities and features in use were observed and registered in field notes and by video recordings by an ethnography-inspired method in which it is important to be present, preferably for long periods of time, to search for patterns. In order to disturb as little as possible when observing, the researcher participated as an 'atypical adult': the observer was accepted as part of the group, but neither as a child nor a staff member (Gulløv and Højlund, 2003).
- 2) The observed forest sites were sketched using signatures such as districts, edges, special features, water and ground cover. The sizes of areas in use were measured by a mobile-phone app.
- 3) Short structured interviews were conducted with an enlarged group of children consisting of all children in the forest preschool, in total 41 children. The children were interviewed and videotaped in 18 groups of 2–4 by a staff member in the forest in early spring. The questions asked were: *Which forest sites do you know? Which forest site do you like the best? Why? What do you do in the forest?* It was assumed that children would mention sites, features and activities of value. Their answers identified meaningful activities and favoured features that the children could remember and were able to articulate at the moment. Semi-structured interviews were conducted with the preschool leader and the 3 staff members of the observed group in the forest in early spring. The themes were: *good forest site, best forest sites and daily choice of forest site*.

- 4) The choices of forest site, risk measures and places to be avoided were discussed informally with the staff on the observation days.
- 5) The staff kept a diary noting their place of stay in the forest for 152 days within the year of the study.

Facts about the 28 forest sites were structured in a table. Information about the observed sites were structured and the maps studied in order to group and categorize site types. The staff statements about daily choices of sites were gathered from field notes and interviews. The interviews with children and staff members were transcribed and statements summarized in a table according to the ten classes of outdoor features, but also remarking statements that did not fit into the classes. The video recordings were viewed and re-viewed and the field notes read and reread in order to find patterns in activities and used features. Then observed activities were added to the table to represent children's nonverbal statements. At last video examples of activities and used features were edited for each class and added to the table.

Permission was obtained from parents to observe, record and use the video sequences for research and education. Permission from the children to make video recordings was obtained all along and the filming stopped when requested.

### 3. Results

The results include facts about the locations chosen as forest sites, the daily choice of sites, features valued by staff and children respectively and considerations about risk.

#### 3.1. Number, location and distance to sites

Within the year of observation, a total of 27 different forest sites were used (Table 1, column 2). The table contains 28 forest sites, because a site known and mentioned in interviews with children was not visited in the period. Observations were made on 15 of these sites. The precise number of forest sites used by the preschool could not be stated since it was in flux: old forest sites went out of use and new sites were discovered.

For safety reasons, forest sites were situated more than 100–150 m from hazardous elements such as deep water bodies with steep sides, roads and railway tracks for safety reasons. However, when children and staff members went on adventure trips from the forest site, they often went to lakes, streams, or close to the railway tracks. It was noted that staff and children stayed closer together on these trips.

The most used forest site was situated 480 m from the preschool building and was used 37 times within the year. The average distance to the four sites, which accounted for 50% of the total number of stays, was 610 m and 75% of all stays were at sites 800 m or less from the preschool (Table 1 column 3 and 4). The average distance to the sites used only once in 2011 was 1130 m. The locations of the forest sites are shown in Fig. 1.

#### 3.2. Good sites and favourite sites

The staff members identified the nine best forest sites for children (Table 1, column 6). The three forest sites mentioned by all staff members had varied features from all classes except Water and Fire. At one of the three sites, water was permanently present; at the others water could be reached on adventure trips.

When children were asked about which forest sites they knew, they mentioned 18 sites by name (Table 1 column 7). Eleven sites were identified as favourites (Table 1 column 8). All sites mentioned as favourite sites by more than one child were also among the 'best sites' mentioned by staff. A short distance was apparently more important for staff than for children; the average distance of the

sites regarded as best by all staff members was 780 m; the average distance for sites favoured by more than one child was 1000 m.

#### 3.3. Site sizes and boundaries

The size of the areas in use at the observed sites varied from approx. 600–1900 m<sup>2</sup>, often largest in winter (Table 1 column 5). A staff member and sub-groups of children would often make off road adventure trips to surrounding areas for shorter or longer stays. This practice increased the available area and affordances. One forest site was fenced, but the gate was usually open.

The boundaries of the forest sites were neither visible nor fixed, but depended on the shifting position of the staff members, since children had to be able to see a staff member. In general, the young children did not move as far from staff members as the older children. This might partly be because their eye-level was lower and their line of sight was obstructed by e.g. vegetation. The boundary for roaming also changed with the seasons; children's line of sight stretched further after defoliation in autumn, but became shorter in the spring. However, this coincided with the affordances being richer in the growing season because of plant parts and greater numbers of small creatures.

#### 3.4. Description of site and site types

The places in the forest that staff selected as forest sites were usually located at intersections between different types of plantings: trees and grass, broadleaf and evergreen, young dense plantings and older more dispersed plantings (Table 2, column 2). The near surroundings often included places of interest for adventure trips with smaller groups of children (Table 2, column 3). The forest sites most often belonged to one of four types (Fig. 2A–D and Table 2, column 4): *The grass glade*: glades with grass (Site 1, 3, 4, 9, 21). *The pillar hall*: areas with tall, dispersed deciduous trees, transparent in winter, shady in summer (Site 2, 7, 8, 11). *The moss glade*: small glades in tall conifers with grass and moss (Site 5, 12, 15). *The meadow*: open areas with grass and solitary trees by forest edges (Site 14, 17).

The terrain at each site was usually varied and included small hills, hollows, ditches, and sometimes low-lying damp areas not suited for tall trees. The forest sites contained a number of shielded places, rigid fixtures and moving fixtures as swinging branches or seesaw logs or alternatively trees suited for hammocks and rope swings. Loose objects and material were present at all the sites and also small creatures, especially during the summer. Open water was not present at all sites, but often found within a short walking distance. Two forest sites had permanent large forest swings and three forest sites had a permanent bonfire area. The sites with bonfire areas accounted for 21% of the stays.

#### 3.5. Staff choices of sites

Every morning, the staff decided where to go. Occasionally, the children were asked for suggestions, but the staff always made the final decision. The choice was quickly made and seemed to be based on intuition, but informal talks revealed that the choice depended on many factors (Table 2, column 5). In the following, some of these factors are mentioned to illustrate important characteristics of forest sites.

##### 3.5.1. Sites to comply with weather conditions

When it was raining, sites were selected that offered some form of shelter, especially for eating lunch and changing nappies, e.g. a planting of old dense spruce trees (Site 5, 15) or a site with a shelter such as a hut made of bales of straw and a tarpaulin (Site 20), or a fire hut (Site 2). A route with many puddles to jump in was

**Table 1**  
Forest sites in use, listed according to number of visits.

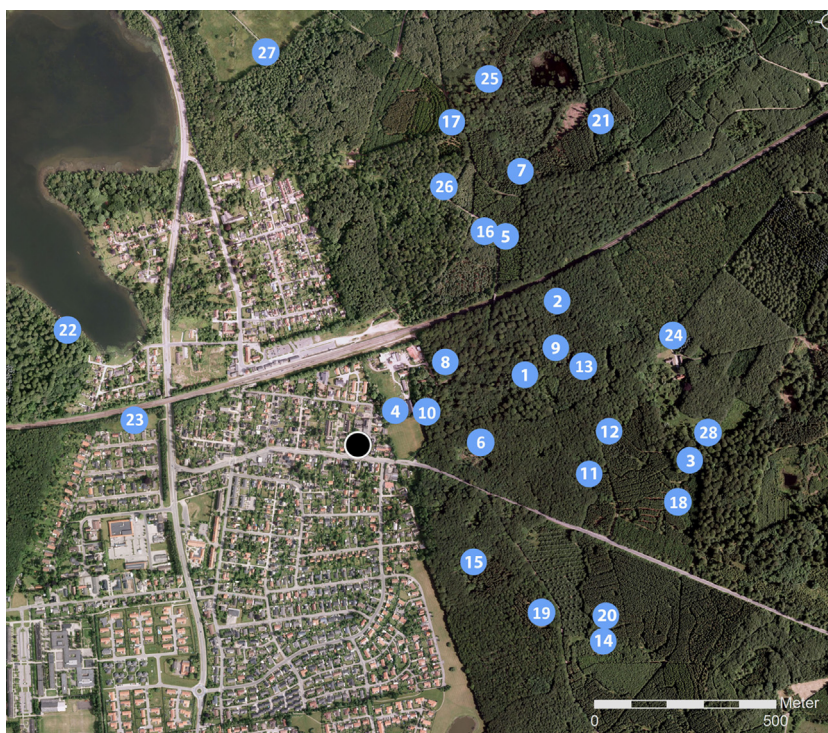
Site no.	Site name (Observed sites in bold)	Visits in 2011 <sup>a</sup> No of days	Distance from house m	Area Winter/ Summer m <sup>2</sup>	Best sites No of staff	Sites known No of children	Sites favoured No of children
1.	The Rush Site	37	480	1930/620	3	18	10
2.	The Spaceship <sup>b</sup>	16	770	1100		8	1
3.	Ladybird Plain	10	1050	1080	3	9	3
4.	The Old Playground	10	140	750		2	
5.	The Grove	8	780	990		4	1
6.	The Bridge	7	410			2	1
7.	The Giant Swing	6	1180	1110	2 <sup>c</sup>	4	1
8.	The Horse	6	220	/720		3	
9.	The Old Fireplace	6	750	570		2	
10.	The Forest Edge	6	350				
11.	The Swings	5	800	/710	3	3	
12.	The Small dens	4	820	/730			
13.	The Roots	4	660			2	
14.	The Sunny Plain	3	1110	/790	2	8	5
15.	The Troll Forest	3	660	/740	2	1	
16.	Across the Grove	3	840				
17.	The Spruces	2	1130	820	2	12	5
18.	The Teddy Bear Plain	2	1150			7	4
19.	The Curve	1	920				
20.	The Straw Hut <sup>d</sup>	1	1060	910	2 <sup>c</sup>	5	3
21.	The Old Giant Swing	1	1470	1040			
22.	Sorø Lake	1	1120			1	1
23.	The Sledge Hill	1	640				
24.	Kristian's Memorial	1	1020				
25.	The Hill	1	1140				
26.	The Larks	1	1070				
27.	The Meadow	1	1740				
28.	The Stone Dike		1140			1	

<sup>a</sup> The destinations of 147 visits were named forest sites; 5 visits went to other places in the forest.

<sup>b</sup> A fire shelter was built here within the year of observation; 4 stays occurred after.

<sup>c</sup> Sites regarded by staff as favourable for children, but with disadvantages for staff.

<sup>d</sup> The site went out of use within the year of observation, but was still used for adventure trips.



**Fig. 1.** Forest sites. Black: preschool building. Blue: forest sites.

sometimes chosen, but most often this was only allowed on the way home. When the sun was shining, sites with low vegetation to the south were preferred, especially in early spring or autumn in

order to catch the first and the last warmth of the year (Site 1, 3, 14). On very hot days, either small glades or places with beech pillar halls were chosen (Site 5, 8, 15), but most sites would do. On windy

**Table 2**

Fifteen observed forest sites: short description, type, what it is suitable for, and attractive areas nearby.

Number, name	Short description of forest site	Nearby areas	Type	Especially suitable for
1. The Rush Site	Glade with small hills and hollows, surrounded by young beeches, and beech pillar hall with a few spruces and self-sown maple. Climbing tree, old fallen beech tree, slanted stumps, logs, swinging branch, hammock-trees, rush, ferns, nearby, good overview	Shallow lake <sup>a</sup> , ditch, spruce planting	Grass glade	Summer drizzle, wind, low staffing, young children
3. The Ladybird Plain	Glade surrounded by dense spruce planting, beech pillar hall and damp area with willow. Climbing trees, boulders, hammock-trees, good overview	Deep hollow, ditches with water <sup>a</sup>	Grass glade	Low staffing, both groups
4. The Old Playground	Grass area with hill, willow, poplar, cherry plums, partly fenced. Climbing trees, hammocks trees, bunch of sand, picnic tables, stones, bonfire area, nearby	Forest edge, beech pillar hall, mown field	Grass glade	Snow, young children, low staffing,
9. The Old Fireplace	Small glade surrounded by young beeches, beeches pillar hall, self-sown maple and shallow lake <sup>a</sup> . Log, fallen trees, swaying trees, bonfire area	Spruce planting	Grass glade	Frost, good staffing (lake, fire)
21. The Old Giant Swing	Grass glade with single old oak and ditch, by beech pillar hall and damp area with willow and bird cherry. Climbing trees, old fallen oak, boulders, large swing, running water <sup>b</sup>	Tall fallen willow across ditch	Grass glade	Good staffing (swing), oldest children
2. The Spaceship	Beech with single spruce trees by ditch. Fallen tree, sitting logs, branch bunches, bonfire area, running water <sup>b</sup> , good overview	Spruce planting	Pillar hall	Good staffing (fire)
7. The Giant Swing	Beech pillar hall by tall spruce planting around two old oak trees and net of ditches. Huge triangular swing, two rope swings, rope ladder, boulders, stumps, clay	Running water <sup>b</sup> , lake, chestnut tree	Pillar hall	Good staffing (swing), the older children
8. The Horse	Beech pillar hall and self-sown maple. Fallen trees, stumps, pieces of wood from felling, branch bunches, boulder, good overview	Shallow lake <sup>a</sup>	Pillar hall	Young children
11. The Swings	Glade by hollow, ditches, spruce, small moss glade and shallow lake <sup>a</sup> . Climbing tree, sitting logs, hammocks trees, branch bunches, running water <sup>b</sup> , good overview	Spruce planting	Pillar hall	Young children
5. The Grove	Small glade surrounded by tall spruce planting, steep grass hillside and ditch. Stumps, sitting log, running water <sup>b</sup>	Beech pillar hall	Moss glade	Rain, wind, hot weather, snow
12. The Small Dens	Small glade surrounded by dense spruce planting with net of ditches with water <sup>a</sup> . Many dens, spruce stems, stumps	Beeches pillar hall	Moss glade	Rain, hot weather
15. The Troll Forest	Small glade with small hills and hollows, surrounded by tall spruce planting, ditch, damp area. Hammock-trees, rush	Beeches pillar hall	Moss glade	Rain, hot weather
14. The Sunny Plain	Meadow with solitary old young oaks, by ditch, tall dense spruce planting, young dense spruce planting and oak. Climbing trees, boulders, hammock trees, ferns	Straw hut, net of ditches	Meadow	Spring and autumn sun
17. The Spruces	Small meadow with solitary firs surrounded by beeches pillar hall with shallow lake <sup>a</sup> and spruce planting. Tall den, climbing trees, sitting logs, stumps, swinging branch, branch bunches.	Ditches	Meadow	Frost, spring and autumn sun, good staffing (lake)
20. The Straw Hut	Straw hut surrounded by dense spruce planting with small moss glades, young beeches, many ditches and damp area with willow	Meadow, fern	Dense spruce	Rain, good staffing (overview)

<sup>a</sup> Dry or nearly dry in summer and early autumn.<sup>b</sup> Still water in summer and early autumn.

days, sites were selected depending on the wind direction. Shelter from the wind was found behind hills or in spruce plantings (Site 5, 20). A young dense beech planting was good for stronger wind as the risk of branches breaking and falling down was a low (Site 1).

### 3.5.2. Sites to take advantage of the seasons

In spring and autumn, sites supporting activities with running water in ditches or brooks were chosen (Site 2, 5, 11). When it was time for frogs' spawn in spring, a site near a lake would be chosen (Site 7). Some forest sites were known to have many frogs and salamanders during summer (Site 3, 9). Sites with special plants such as ferns or tall grasses were selected in the summer, and sites with berries, hazelnuts or chestnuts were chosen in the autumn. In snow, a site near a mown field where the children could build snowmen and play in the snow was chosen (Site 4), or a site with sloping terrain for sledging and sliding (Site 5). During frost, locations with shallow water in pits, ditches or lakes were chosen for skating and sliding, activities with lumps of ice, and for ice hockey with branches (Site 9, 17, 20). Some sites were connected to specific

seasonal traditions such as waking up the Christmas pixy in his hill (Site 25, not observed).

### 3.5.3. Sites to support specific activities

The site could be chosen because of particular features that afforded specific activities such as clay in the ground (Site 7), areas suitable for group activities (Site 3), or specific materials either used at the site or taken back to the preschool for on-going staff-initiated projects. Built features could also be the reason for choosing a particular site, e.g. sites with attractive dens (Site 5, 12, 17), large swings (Site 7, 21), bonfire areas (Site 2, 4, 9) or a wooden bridge (Site 6, not observed).

### 3.5.4. Sites for specific groups

The actual group of children combined with observations about what had happened the day before or the last time the preschool had used the specific site played a role in the selection of site. When new and/or very young children were part of the group, staff would often choose a site with a good overview that was not too far away (Site 1, 4). Otherwise the age of the children was not considered



A. Grass glade



B. Moss glade



C. Pillar Hall

Figure 2. Types of forest sites



D. Meadow/Forest edge

Fig. 2. Types of forest sites.

A. Grass glade

B. Moss glade

C. Pillar Hall

D. Meadow/Forest edge

when selecting sites, although a staff member remarked that the youngest children would probably be content to explore the same site again and again as they tended to enjoy familiarity, whereas the older children preferred to stay at a number of sites. Large swings that could carry many children were highlighted as being especially attractive for the oldest children (Site 7, 21). On occasions where only older children were present, attractive sites far away were chosen. When both groups at the preschool occasionally went to the forest together, a good overview was also important (Site 3). The staff members stated that there was no reason to choose sites in relation to gender, when they occasionally went on trips with only boys or girls. This was supported by the observations: boys and girls were attracted to the same features, though they often, but not always, played with their best friends who were often children of the same gender.

### 3.5.5. Sites for scarcity in time or low staffing

If the group left late, sites closest to the preschool's premises were often chosen (Site 1, 4, 8). Low staffing resulted in choice of sites with a good overview (Site 1, 4) and meant that sites with large swings or open water were avoided since sufficient staff was necessary to reduce the risk of accidents and to change wet clothes.

To summarise, the choice of site was an act of educational expertise. The staff valued sites with many affordances for children and made use of a range of sites with different characteristics such as sites with and without water, sites with nearby areas to explore, sites fit to various weather conditions, sites to exploit the fleeting opportunities of the season, sites with particular natural or man-made features, and sites with challenging features for the oldest. The assessment of affordances included knowledge about the actual group of children and their abilities and interests, but also factors such as the time available for the trip and stay, the need for surveillance, and the actual staffing. The choice was a combination of 1:

the location and affording features of the site influenced by the weather and season and 2: the actual group of children and level of staffing.

### 3.6. Features valued by staff, interviews and informal talks

When interviewed in situ about the important features of a good forest site, the first aspect that was mentioned by all staff members was the presence of features appropriate for climbing, balancing and swinging such as climbing trees, fallen trees, ditches and swings. This was followed by open spaces, preferably sunny, for running and group activities, and denser plantings for activities in smaller groups, for defining your own place and for hiding. A good site should have these features not too far from each other. In statements about important features of a good forest site and for the daily choice of forest site, features from all ten classes of outdoor features were mentioned (Table 3 column 2).

Other topics mentioned as important for a good forest site was a short distance from the preschool buildings resulting in more time for play, and good overview and surveillance. As earlier mentioned, these topics were of special importance in situations where children were young or staffing low.

Not only the site itself, but also the surroundings were mentioned as important, such as interesting places to explore nearby increasing the available affordances by having a different vegetation, topography or water bodies.

### 3.7. Features and activities valued by children, interviews

When children were asked why they favoured a forest site, they mentioned activities as well as features. Most answers about sites and activities were connected to features from the ten classes of outdoor features (Table 3 column 3). The high number and detailed

**Table 3**

Statements about valued features and activities, arranged according to the 10 classes of outdoor features, links to examples.

Classes of outdoor features Key activities <sup>a</sup>	Staff statements about valued features (Interviews, informal talks)	Children's verbal statements about valued features/activities (Interviews)	Children's non-verbal statements about valued activities (Observations)	Activities/used features(Videos)
<b>1. Open ground</b> Run, drive, walk	Good overview, sunny spaces, some distance between trees, quiet road for running	So much sun, sun so you do not get cold hands, play tag, walk in the forest	Walking, running, singing games, games in larger groups	<a href="https://youtu.be/OdNfkhLHp-Q">https://youtu.be/OdNfkhLHp-Q</a>
<b>2. Sloping terrain</b> Roll, slide, clamber	Many ditches, a steep slope, a deep ditch where you balance on branches to get to the other side, hill for sledging, hills for lee	Play on the bridge, play troll, play the Three Billy Goats	Rolling/sliding/running down, rolling objects down, jumping down, climbing up; for ditches: jumping over, building over, hiding in, sitting in	<a href="https://youtu.be/24AllifzqI8">https://youtu.be/24AllifzqI8</a>
<b>3. Shielded places</b> Hide, as frame	Many nooks, shelters, huts, a place to make dens, conifer forest, dense low plantings, pillar halls	A hut, a hut with straw, play hide-and-peek, make dens	Microclimate, privacy, hiding in, lying in, sitting in, moving from one place to another, looking and listening into adjacent places	<a href="https://youtu.be/QTy0qx3uyI">https://youtu.be/QTy0qx3uyI</a>
<b>4. Rigid fixtures</b> Climb, balance, jump	Good climbing trees, a big stump, felled trees, a large fallen crooked tree	A big rock, a fallen tree you can climb in and on	Sitting-on, jumping-on/over/down-from, running around, hiding behind, building on, looking out from, passing from one place to another, lying-on, climbing, balancing-on, hanging by arms, hanging in legs	<a href="https://youtu.be/S11EL3oVMGE">https://youtu.be/S11EL3oVMGE</a>
<b>5. Moving fixtures</b> Swing, sway, seesaw, spin	Swinging branches, stationary forest swings, trees for ropes and hammock	Tall swings	Swinging-on, swaying-in, seesawing-on, looking out from, spinning, sitting in, lying on	<a href="https://youtu.be/XNraXj-XNQ">https://youtu.be/XNraXj-XNQ</a>
<b>6. Loose objects</b> Arrange, modify, as tools, props, treasures	Rush, chestnuts, edible berries	So many sticks, the straw, many bamboo sticks, so much rush, all kind of things, so much forest chewing gum, ferns, so many things to find, much spruce, find sticks, break sticks, play with sticks, find things, collect things, find cones, eat lots of things, play-eat, make patterns with rush, saw branches, carve, go on bone hunt, many bones, skulls, skeletons	Drawing, scratching, throwing, hammering, batting, digging, cutting, tearing, crumbling, squashing, building of structures, pole vaulting, picking, gathering, sorting, making patterns, as accessories, throwing, sawing, carving, bending, breaking, thatching, crushing, hacking, tasting, eating, kicking in, looking up in handbooks (trees, flowers, fruit, fungi)	<a href="https://youtu.be/ZRzAi0Pm4s">https://youtu.be/ZRzAi0Pm4s</a>
<b>7. Loose material</b> Dig, move, mould, smear	Clay, mud	Dig, shovel	Construction of objects, pouring, modification of surface, moving around, moulding, smearing, kneading, smashing, digging-in, kicking in, gliding in	<a href="https://youtu.be/qni7IbAcPRU">https://youtu.be/qni7IbAcPRU</a>
<b>8. Water</b> Pour, mix, splash, float	Open water, small streams, (at the site or nearby)	Play in the streams, bathe when it is summer	Splashing, pouring, floating objects, fishing, mixing with other materials, gathering, throwing into, jumping in, floating with the stream, building of dams	<a href="https://youtu.be/i-9QSu7O3fU">https://youtu.be/i-9QSu7O3fU</a>
<b>9. Creatures</b> Look for, handle, care	Frogs' eggs, toads, salamanders	Find animals, find dead animals	Following, catching, caring for, imitating, making creature home, looking up in handbooks (creep, eggshells, feathers, track, galls)	<a href="https://youtu.be/jZT1sXW8yOY">https://youtu.be/jZT1sXW8yOY</a>
<b>10. Fire</b> Feed, look after, sit by	Areas for bonfire	Nice and cosy and you can make fire	Feeding, poking with sticks, sitting by, follow cooking, drawing with charcoal, putting out	<a href="https://youtu.be/TTSXBEGFVYI">https://youtu.be/TTSXBEGFVYI</a>

<sup>a</sup> Key activities = distinctive and attractive activities for each class, a part of the classification.

nature of the answers that referred to loose objects including plant parts and tools was noteworthy. Children mentioned plant parts in general such as sticks, but also as plant parts from specific species such as rush, fern and spruce. The frequency with which the words *many* and *much* were mentioned signalled that abundance was considered a quality. Whether finding dead animals, skulls, skeletons and bones belong to the creatures or loose objects class is debatable as these were indeed loose objects, but at the same time they were starting points for extended and specific activities and discussions about the animals and their way of life.

Some activities mentioned were not connected to features from the ten classes of outdoor features, such as playing, talking, lunch-eating or having a cosy time. Also comments like 'because it is not so far' as a reason for favouring a site, and statements about activities such as 'see the tractors that cut down the trees, and forest workers, and hear them felling trees' were not connected to any one specific class of features, but may identify other issues favoured by children such as a short walking distance and opportunities to observe people in action.

### 3.8. Activities and features valued by children, observations

The meaningful action possibilities of the setting, the affordances, were approximated by observing children's activities and the used features in the period of observation, here arranged according to the ten classes of outdoor features (Table 3, column 4). Features from all classes were of importance for children (links to examples of activities and features in Table 3, column 5). Viewing and reviewing the videos supported and greatly expanded the verbal statements of children. In line with children's statements in interviews, loose objects were prominent and part of almost all activities.

Children explored the site and found or made their own places in vegetation or dens, ditches or behind fixtures such as tree trunks or stumps. Children sought out terrain and fixtures that offered opportunities for climbing in, jumping from, moving on, over, under and around, but also as sites for talking and rest. *Variation and gradation were important*: once a particular tree had been climbed and become familiar, a different and often challenging tree would be sought out. Moving fixtures that could move together with children were especially attractive. Loose objects of all sizes and types were picked up and had multiple functions. Soil, mud and other small-grained materials were appealing features; water was irresistible in all forms. Small creatures and animal left-overs were especially intriguing, and fire was attractive. Children often observed other children in action and later tried out the features themselves.

Special features were sought out such as a slanting stump, a forked tree, a branch for swinging, or closely growing trees that allowed children to climb from one to the other. Special objects such as crooked sticks, strange stones, puffballs, traces of creatures and pieces of litter were also detected, picked up and used. *New and different features were especially attractive* for instance when water turned to ice or a tree was felled by the storm. An important source of change was plant growth and decay and the appearance of creatures and traces of creatures. Children welcomed the successive waves of plants, plant parts and small creatures during the growing season. Children detected, investigated and talked about even small changes and anomalies such as appearing fungi and fruit, a leaf with another colour or with a gall. New features were also appearing due to children's modifications of the setting. This was supplemented with temporary features created by the staff members such as rope swings, rope tracks, hammocks or bonfire. Sawdust, stumps and pieces of wood appeared after felling by foresters, and other forest visitors also occasionally left objects behind.

In all classes of features, children often sought out or created features that provided different and not fully explored action pos-

sibilities: the moving and unstable, the loose and modifiable, the new and inspiring.

### 3.9. Similarities and differences in opinions of children and staff

In most cases children's favourite forest sites and staff members' best sites were the same. The most frequently used forest site was well suited for both staff and children (Site 1), although one staff member personally thought it was getting a bit too familiar. Other sites favoured by children as well as staff members were not frequently used, probably due to the fact that they were situated quite far from the preschool premises (Site 14, 17).

Two of the nine sites identified by staff as good sites for children were not regarded as attractive for the staff. The first site (Site 20) was a dense planting of spruce combined with a network of ditches. A staff member described it like this:

The Straw Hut. "There you have to run while bending down all the time. You don't have the overview like at, for example, the Rush Site, the Spruces or the Spaceship. [...] By the Straw Hut there are so many places, you can run around, it's a fantastic, cool place for children and a site they prioritise. But if you do not know where the children are, you have to spend energy on it, and then you have less time to be with the children who are carving or playing with water."

The second site mentioned (Site 7) had a large swing in a tall oak tree. It was very attractive, but required the presence of a staff member to prevent accidents. This reduced the number of staff members available follow children's activities at other parts of the site. Sites with open water were also sometimes avoided because of the need for surveillance, although the children were observed to be exceptionally fond of water.

In these cases, where children and staff opinion differed, surveillance was an issue whether it was due to bad overview on the site or the presence of staff-demanding features.

### 3.10. Risk

The risk of getting lost was reckoned, but the staff did not ask for fencing, since the flexibility of the boundaries was seen as an educational advantage. However, according to the head of the preschool, it might take some time to get used to it:

"What I experienced when I started was that I thought – oh! – they're not all here. I know the sound of 22 children. It's much louder when you are back at home in the playground than when you take them to the forest, so I thought: they're not all here. For many days in the beginning I went around and counted, yes, now they're all here, then after 15 min I thought, oh no, now they're not here, but they were. When I had done that quite a few times [...], I started trusting that they were all there. This went on for quite a while in the beginning. . ."

At the forest sites, tall trees, rotten branches, spikes, pointed sticks and boulders were present. The only measure taken to minimise risk was that temporary hammocks and swings were not suspended above rocks or stumps with spikes. New children would often stumble and fall over small branches or slip on sloping terrain, but they soon learned to cope. The children often sought out the thrill of unstable objects and slippery ground. The continual tuning and re-tuning processes between children and the changing setting apparently resulted in a physical and mental preparedness for surprising events (See <https://youtu.be/oRReXbnDUOQ>, duration 4:24).

Rules existed concerning the large swings, fire, the use of sharp tools such as saws and sheath knives, and asking before eating berries and mushrooms. Informal talks revealed that with these precautions and rules in place, the staff reckoned the forest to be



safer than a traditional playground because of more space, fewer conflicts, and the forest floor, which is softer than tarmac and paving slabs.

#### 4. Discussion

The daily choice of site entailed considerations about the terms and opportunities given by season and the weather, the desired activities, and the actual group of children and staff. Gender of children was not an issue, which supports the findings of Ånggård (2011) that forest features are not gender specific.

Staff valued the availability of a number of sites with different features, which made it possible to take advantage of emerging opportunities and to use professional skills when selecting which site to use. Sites with poor overview, water bodies or large swings were avoided and bonfire not ignited when staffing was low.

The distance to the sites was an important factor in the daily site choice, often more important than whether a site was favoured or not; even with a group of children accustomed to daily walks (Table 1, column 3, 4, 6 and 8). This suggests that distance could be one of the main barriers for preschool outdoor stay in green spaces and forest. Short distances and proximity to the school premises and dwellings were likewise found to be important, e.g. in public playground planning (Jansson, 2010; Refshauge et al., 2012).

The daily choice of forest site was at the one hand based on the range of features on the sites and how the site was situated, on the other hand on other factors as knowledge about the abilities of the actual group of children present, the need for surveillance, and the level of staffing. Whereas most playgrounds have to be designed to function well in relation to all children in all kind of weather and seasons, and even at the lowest level of staffing that occurs, having a number of different forest sites enabled the choice of a site that complied with the actual weather and season, the actual group of children, and the actual level of staffing.

##### 4.1. Affording features

The present study confirmed that children value features providing varied affordances. This corresponds with interviews of children aged 6–11 about public playgrounds showing that “the playground is ‘what you can do’” (Jansson, 2008, p. 96).

In the present study children used features from all ten classes of outdoor features, but when asked, children emphasised the importance of various loose objects including tools. This might be because children know a lot of words for loose objects, but this may at the same time be a sign of their importance. Loose objects and material have long been recognized as being important for children’s play and development (Herrington and Studtmann, 1998; Kylin, 2004; Nicholson, 1972), and have also been mentioned by children as important in other studies (Kylin, 2004). The observations showed that all kinds of loose objects and material were of interest including litter, but clearly, certain plants and plant parts had special and attractive properties as also mentioned by the children. Furthermore, plant parts provided shifting affordances depending on the season. This supports earlier findings from Denmark, the US and Sweden about the attractiveness of plant parts for children’s activities (Brøndegaard, 1960, 1987; Moore, 1993; Klintberg, 2012).

Since different classifications of outdoor features are in use, it is not simple to compare the setting in different studies. In a study conducted in a garden summer camp for children aged 7–12 in Finland (Laaksoharju et al., 2012), child-initiated play was supported by many of the same classes of features observed in the present study; only features from the classes Sloping Terrain, Moving Fixtures and Fire were not mentioned. In the US Moore (2014) structured nature play and learning places for children and families

in 19 activity settings, likewise including many similar classes as in the present study, except the class Moving Fixtures.

##### 4.2. Adventure and safety

The forest was well known by the children; they knew the names of many forest sites and were able to mention features and qualities of specific sites. At the same time, children noticed small differences and were especially attracted to new affordances offered by changes in the setting. They appeared to be skilled in detecting, exploring and exploiting novelties and passing opportunities, something which has also been reported about children in a small village by Jones (2000). The many, varied and last but not least changing affordances provided by the forest seemed to comply with and enhance the varied abilities and developing skills and interests of the children.

Generally, the forest sites were not fenced in and children were apparently able to administer internalised boundaries; a term inspired by Bruno Latour and referred to as primarily mental boundaries by Gitz-Johansen et al. (2001). Different sites with flexible borders enabled the daily choice of site and site size in relation to educational goals and the state of the group. The educational advantages of sub-sites with flexible borders were also reported by teachers in a post occupancy study of 11 educational outdoor settings in the US (Dennis et al., 2014). The fact that fencing is not always necessary may facilitate multifunctional use of green spaces and forest. Still, the need for fencing will depend on the area; fencing may be necessary in areas in close proximity to hazardous elements.

As previously mentioned, the continual adaption to varied and changing settings probably led to preparedness for surprising events. Fjørtoft (2001) also found that children’s coordination and balance skills improved through playing on varied terrain with a variety of vegetation. These skills may have contributed to the apparently relaxed attitude of the staff regarding risk, which made sites that may not be considered as safe according to the safety standards of play equipment, suitable for stays. Green settings may be attractive and function well for preschool stays even if they do not meet all playground safety standards. Furthermore, possibilities to approach and get acquainted with risky and thrilling features may lead to better risk assessment and less phobias later in life (Sandseter and Kennair, 2011).

##### 4.3. Generalizations and user involvement

The fact that the results of the study are based on one specific forest preschool, where the forest was deliberately chosen as a frame for frequent stays, may lead one to question the extent to which it is reasonable to make generalisations based on the results. Still, the affording features of several forest sites observed through a year in this single forest preschool may also be affording features for children in other preschools. Therefore, the results may inspire the design and management of green settings for preschools until better data are available.

In each case the preschool buildings and playgrounds to supplement will vary, as will the distances to the green settings and the staff member’s approach to risk and necessary level of surveillance. The preschool terms in relation to staffing and time available for outdoor trips and stays vary as well. This calls for a place-based and user-involved approach in green space and forest management in line with the user-involvement and strategy formulation emphasised in related studies of playgrounds and nature play and learning places (Moore and Cosco, 2014; Moore, 2014; Jansson and Ramberg, 2012).

#### 4.4. Methodological considerations

The concept of affordances defined as the meaningful action possibilities of a setting was fruitful by focusing on three intertwined aspects: the abilities and interests of groups of children, the features in a setting, and the action possibilities they offered. Furthermore, the affordance concept underlined the dynamic aspect: children develop over time, adapt and are adapted to settings.

Preschool children may not be able to express in words why they like a site. Memories may be connected to the weather or the general atmosphere in the group on a particular day and may have little or nothing to do with the actual setting. That children were interviewed together clearly made it easier for them to talk, although this probably also influenced their answers. The interviews revealed what was remembered and possible to articulate; the observations showed what was chosen and used. The two sources of information supplemented each other, but in this study the observations provided the most detailed picture of affordances and affording features for children.

#### 5. Conclusion

This study has provided detailed information about the characteristics of locations picked out as forest sites, the daily choice of forest sites, and the sites and features valued by children and staff in a Danish forest preschool. The locations selected could be characterized as places with varied features and changes caused by the weather and seasons. The forest sites continually supported the actions of growing and developing children.

The staff preferred to have a number of different sites at disposal, since it enabled the daily choice of forest site in relation to the actual features at the site as well as the educational aims, the actual group of children and the actual staffing. Children especially emphasised the importance of varied and abundant loose objects, but observations showed that they were attracted to all features that provided different and not fully explored action possibilities thereby underlining variety and change as important qualities.

Planning and design with affordances in mind focus on settings offering continually meaningful action possibilities. The study showed that other factors also influenced the choice and use of forest sites: the distance to the preschool, the surrounding areas, the weather and season, the abilities of the children, and the level of preschool staffing. Nevertheless, the concept of affordances and affording features may be a practical outset for a fruitful discussion between professionals with an interest in planning and design of green settings for children in preschools.

#### References

- Ånggard, E., 2011. Children's gendered and non-gendered play in natural spaces. *Child. Youth Environ.* 21, 5–33.
- Boldemann, C., Dal, H., Mårtensson, F., Cosco, N., Moore, R., Bieber, B., Blennow, M., Pagels, P., Raustorp, A., Wester, U., 2011. Preschool outdoor play environment may combine promotion of children's physical activity and sun protection. Further evidence from Southern Sweden and North Carolina. *Sci. Sports* 26, 72–82.
- Brøndegaard, V.J., 1960. Danske Børnelege med Blomster og andre Plantedele. *Sprog og Kultur*, 11–76.
- Brøndegaard, V.J., 1987. Folk og flora: dansk etnobotanik. Bind 1–4. Rosenkilde og Bagger, Kbh.
- Cosco, N.G., 2006. Motivation to Move: Physical Activity Affordances in Preschool Play. Areas Doctoral Thesis. Heriot Watt University.
- Danmarks Statistik. 2013. Andel af børn i dagtilbud 1998 – 2013 [Online]. Available: <http://www.bupl.dk/presse/statistik.om.boern.og.paedagoger/antal.boern.i.institution.2007.-2013?opendocument> [Accessed 03.01 2015].
- Dennis Jr., S.F., Wells, A., Bishop, C., 2014. A post-occupancy study of nature-based outdoor classrooms in early childhood education. *Child. Youth Environ.* 24, 35–52.
- Fjørtoft, I., Sageie, J., 2000. The natural environment as a playground for children: landscape description and analyses of a natural playscape. *Landscape Urban Plann.* 48, 83–97.
- Fjørtoft, I., 2001. The natural environment as a playground for children: the impact of outdoor play activities in pre-primary school children. *Early Child. Educ. J.* 29, 111–117.
- Gibson, J.J., 1979. *The Ecological Approach to Visual Perception*. Houghton Mifflin.
- Gitz-Johansen, T., Kampmann, J., Kirkeby, I.M., Rum, F., 2001. Samspil mellem børn og skolens fysiske ramme. Rum, Form, Funktion.
- Grahn, P., Mårtensson, F., Lindblad, B., Nilsson, P., Ekman, A., 1997. Ute på dagis, hur använder barn daghemsgården?, utformningen av daghemsgården och dess betydelse för lek, motorik och koncentrationsförmåga. Mouvium, Alnarp.
- Gulløv, E., Højlund, S., 2003. Feltarbejde blandt børn: metodologi og etik i etnografisk børneforskning. Gyldendal Uddannelse.
- Heft, H., Kyttä, M., 2006. A psychologically meaningful description of environments requires a relational approach. *Hous. Theory Soc.* 23, 210–213.
- Heft, H., 1988. Affordances of children's environments: a functional approach to environmental design. *Child. Environ. Q.* 15, 29–37.
- Herrington, S., Studtmann, K., 1998. Landscape interventions: new directions for the design of children's outdoor play environments. *Landscape Urban Plann.* 42, 191–205.
- Jansson, M., Ramberg, U., 2012. Implementation and effects of user participation in playground management: a comparative study of two Swedish municipalities. *Managing Leisure* 17, 1–13.
- Jansson, M., 2008. Children's perspectives on public playgrounds in two Swedish communities. *Child. Youth Environ.* 18, 88–109.
- Jansson, M., 2010. Attractive playgrounds: some factors affecting user interest and visiting patterns. *Landscape Res.* 35, 63–81.
- Jones, O., 2000. Purity, disorder, childhood and space. *Child. Geogr. Play. Living Learn.* 8, 19.
- Kiener, S., 2004. Zum Forschungsstand über Waldkindergärten] State of research on forest kindergartens. *Schweizerische Zeitschrift für Forstwesen* 155, 71–76.
- Kiener, S., 2009. Was bringen Naturerlebnisse Kindern? ERBINAT. Fachverband erleben und Bildung in der Natur.
- Kirkby, M., 1989. Nature as refuge in children's environments. *Child. Environ. Q.* 6, 7–12.
- Klintberg af, B., 2012. Barnelekar i växstriket. *RIG – kulturhistorisk tidsskrift*, 95.
- Kylin, M., 2003. Children's dens. *Child. Youth Environ.* 13, 30–55.
- Kylin, M., 2004. Från koja till plan. Swedish University of Agricultural Sciences.
- Laaksoharju, T., Rappe, E., Kaivola, T., 2012. Garden affordances for social learning, play, and for building nature-child relationship. *Urban For. Urban Green.* 11, 195–203.
- Lerstrup, I., Møller, M.S., 2016. Affordances of Ditches for Children in Preschool. *Child. Youth Environ.*, in press.
- Lerstrup, I., van den Bosch, C.C.K., 2016. Affordances of outdoor settings for children in preschool: revisiting Heft's functional taxonomy. *Landscape Res.* (in press).
- Lysklett, O.B., 2013. Ute hele uka: natur-og friluftsbarnhagen. Universitetsforlaget.
- Mårtensson, F., 2004. Landskapet i leken. Swedish University of Agricultural Sciences, Alnarp.
- Moore, R.C., Cosco, N., 2014. Growing up green: naturalization as a health promotion strategy in early childhood outdoor learning environments. *Child. Youth Environ.* 24, 168–191.
- Moore, R.C., 1993. *Plants for Play: A Plant Selection Guide for Children's Outdoor Environments*. MIG Communications, Berkeley, USA.
- Moore, R.C., 2014. *Nature Play & Learning Places. Creating and Managing Places Where Children Engage with Nature*. Natural Learning Initiative, Natural Learning Initiative and National Wildlife Federation, Raleigh, NC.
- Nicholson, S., 1972. The theory of loose parts: an important principle for design methodology. *Stud. Des. Educ. Craft Technol.* 4, 5–14.
- O'Brien, L., Murray, R., 2007. Forest School and its impacts on young children: case studies in Britain. *Urban For. Urban Green.* 6, 249–265.
- O'Brien, L., 2009. Learning outdoors: the forest school approach. *Education* 3–13 (37), 45–60.
- Refshauge, A.D., Stigsdotter, U.K., Cosco, N.G., 2012. Adults' motivation for bringing their children to park playgrounds. *Urban For. Urban Green.* 11, 396–405.
- Söderström, M., Boldemann, C., Sahlin, U., Mårtensson, F., Raustorp, A., Blennow, M., 2013. The quality of the outdoor environment influences children's health – a cross-sectional study of preschools. *Acta Paediatrica* (Oslo, Norway: 1992) 102, 83.
- Sandseter, E.B.H., Kennair, L.E.O., 2011. Children's risky play from an evolutionary perspective: the anti-phobic effects of thrilling experiences. *Evol. Psychol.* 9 (147470491100900212).
- Sandseter, E.B.H., 2009. Affordances for risky play in preschool: the importance of features in the play environment. *Early Child. Educ. J.* 36, 439–446.
- Vigsø, B., Nielsen, V., 2006. *Børn & udeliv*. CVU Vest Press, Esbjerg.