Landscapes between Signal and Data: Formal Identification and Analysis of Forest Clearings in Oslo through Lidar Data

Maximilian Schob[1], Luis Callejas[2]

[1]Norwegian University of Life Sciences (NMBU)/Norway · maximilian.schob@nmbu.no
[2]The Oslo School of Architecture and Design (AHO)/Norway

Abstract: This article investigates how airborne light detection and ranging (lidar) point cloud data and their embedded data models can serve as the basis for revealing, studying, and manipulating clearings in the urban forest situated in the north of Oslo. Furthermore, the article describes the unique high-resolution public and open digital data and infrastructure that surveys these landscapes in Norway. The main research question is concerned with whether the extensive public data available in Norway can reveal unseen and undervalued clearings with potential value as remnants of an important and unique cultural landscape practice. The methodology involves sampling data models from prevalent publicly available urban planning and forest management datasets and applying them to high-resolution lidar scans of the forest. Beyond the initial identification of precise landscape figures, this methodology introduces a creative visual workflow to appreciate, evaluate and work with the previously undervalued clearings in the Oslo forest. The article further hypothesizes on how certain morphological conditions of the Oslo forest clearings are only thoroughly visible and open to analysis and manipulation through high-resolution lidar surveys.

The value of the particular case of Oslo is twofold. First, the databases in Norway for performing such analysis are public, facilitating the necessary accessibility to conduct such research. Second, a history of careful urban forest management, reconciling the public use of the forest with the interests of commercial forestry, have developed into unique and delicate ways to perform clear-cutting in the urban forest around Oslo. The convergence of these two outlined unique conditions present the need to perform this study in Oslo rather than in other locations; however, the workflow and methodology described here could be applied to other forested areas in the presence of available data and unique aspects of clear-cutting that can be re-valued through imaging.

The nature of lidar data collection, analysis, and applications in a design workflow are generally understood, and its disciplinary implications are generally well delineated (URECH et al. 2020); however, working creatively with the data opens an under-explored arena for design disciplines, one in which the aesthetic, poetic and formal evaluation of the data is used not to classify the land and tree cover (BELL et al. 2018), but to instead scout and reveal landscape entities typically seen as of lesser value or simply under-described.

As geospatial data becomes raw matter and part of the everyday design workflow of architecture and landscape architecture practice (URECH et al. 2020), designers need new ways to frame data as creative media in these disciplines. In this article, we describe the base condition of geospatial data as multivariate (ASH et al. 2018) – many definitions and derivatives of itself in dependence on the systems they are embedded in. We introduce terminologies such as model sampling and data scouting to give way to the formulation of data models in landscape architecture, with a particular focus on lidar surveys of the forest around Oslo.

Keywords: Forest clearing, urban forest, model sampling, data scouting, lidar

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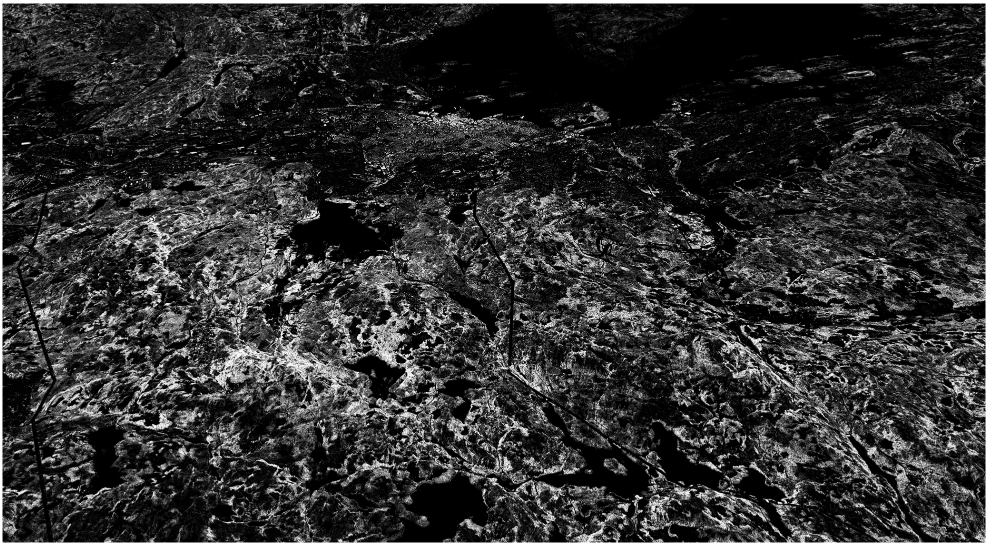

Fig. 1: Forest patterns as Canopy Height Model (CHM) draped over a Digital Surface Model (DSM) for the forest north of Oslo, looking from north to south. The city of Oslo is visible as a white pattern of dense urban agglomeration in the upper central part of the image.

1 Introduction

The clearing is a preeminent and timeless landscape figure that has been framed in architecture and landscape architecture as archetypal, particularly in the west, going as far as describing the origin of the discipline through this spatial metaphor (DRIPPS 1999, GIROT 2016). In this paper, we interrogate the undervalued existence of the myriad of clearings near Oslo by using contemporary surveying technologies that further reveal what is (morphologically) particular about the clearings around Oslo. We aim to elevate the cultural landscape value of the clearings surrounding Oslo, first by revealing them and then carefully describing them through the lidar surveys that depict them with high precision.

The research, workflow, and images produced by the authors revealing and analyzing the clearings were later tested as two separate yet interrelated experiments with master students in order to test the operationality and transmissibility of this methodology with students that were tasked with re-designing clearings: The first was in the context of an advanced master studio at the architecture school at Yale in collaboration with the landscape program at AHO in Oslo in 2020 (CALLEJAS 2021). In this first case, students could not visit the sites and only access them through the analysis of data models. In the second case, the methodology was applied in the context of the exhibition "arboretum, l'arbre comme architecture" at arc en rêve centre d'architecture in Bordeaux, France, in 2021. The studio between Yale and AHO tested the transmissibility of this method to master's students in architecture and landscape architecture, while the exhibition at arc en rêve generated new visuals from the research following the refined methodology.

The research on the clearings is independent of the experiments with the master's students; however, testing the methodology with students exposed how this workflow can empower designers tasked with intervening in those landscapes where the forest meets the urban fabric. It was of particular importance that the author's research could be disseminated among students with a clear methodology that they could use for their own manipulations of the clearings. These formal manipulations are not the main output of the research but rather test and proof of the operationality of the methodology, which gain significance when shared with designers, who are mainly focused on propositions rather than observation.

2 Marka: The Urban Forests of Oslo

The city of Oslo is surrounded by dense forest regions – Marka. Although only a certain portion of Marka belongs to the municipality of Oslo, the entire region of Marka is continuously surveyed by the city of Oslo (NÆSS et al. 2011, TIITU et al. 2021). The border between the city and Marka has remained mostly unchanged since the 1936 Municipal Master Plan of Oslo and was protected by national law in 2009 (KLIMA- OG MILJØDEPARTEMENTET 2009). This has led to both a densification of the urban fabric approaching the border of Marka, as well as the preservation of the forest areas within Marka (TIITU et al. 2021). As a result, there is no transitional space between the city and the forest, but instead, a dense urban fabric that abruptly stops at the edge of the forest of Marka.

The close spatial juxtaposition of the urban area and the forest has extended the reach of functional spaces of the city into the forest. Forest clearings typical of forestry practices aggregate the overlapping agencies, we claim, of forest management and production of urban spaces. The urban forest is not defined as classification in prevalent datasets for land cover classification on a global and a local scale. In terms of their spectral signature, these two classes relate to polar opposite definitions.

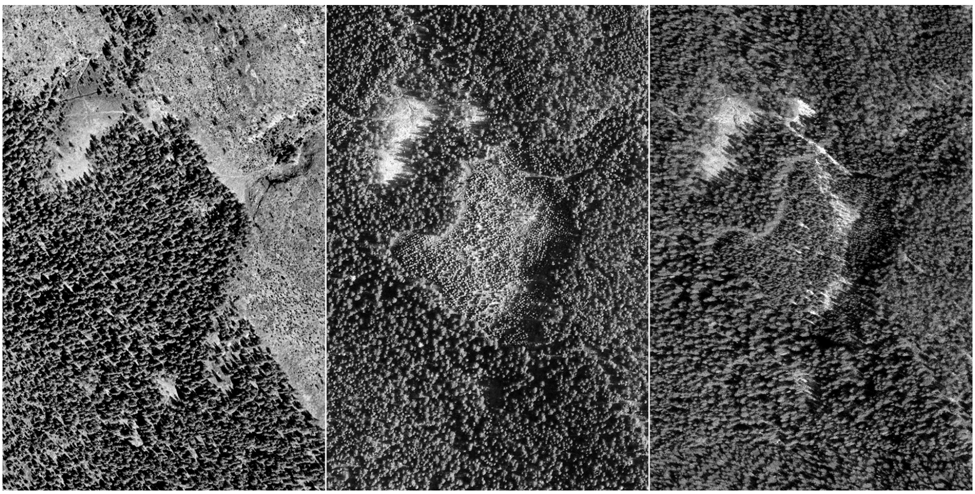

Fig. 2: Forest clearing site captured through aerial imagery at three points in time over a period of 43 years, from left to right in 1976, 2011, and 2019

We trace the distinct shapes of clearings to translate them and the underlying forces of their emergence into a design environment. We look at the urban forest in the North of Oslo, in particular, at forest clearings, to define a new spatial typology that is situated in between urban and natural landscapes. The forest clearings not only are "found" and classified through the study of images arising from manipulating data but also have the potential to be studied as voids with different qualities to serve the city of Oslo. These morphological qualities, we claim, are only truly visible in the lidar surveys. Furthermore, the notion of the clearing as a void could also be questioned by looking at the data at higher resolutions, which we have not done yet, but vegetation in the clearings of considerably smaller scale than mature trees could be evaluated with higher resolution scans of individual clearings.

We encounter these landscapes through remote sensing technologies, and in particular data derived from lidar scanning, which are produced in a standardized environment to support urban planning and environmental management practices. We consider how the standardization of geospatial data processing models may constrain the emergence of new, or yet unknown, typologies of landscapes. We compare available datasets (derivative data produced from large-scale capturing processes) to new potential data compositions that may aid in describing the emerging figure of the forest clearing.

3 Data for Clearings

"Medium resolution satellite images such as Landsat (30 m) and SPOT (10–20 m) have been applied to measure forest logging since they can detect forest clearing down to 0.1 ha resolution" (GAO et al. 2020) 0.1 ha are 1000 m². The area covered by a Landsat pixel at 30 meters resolution is 900 m². Our selection of clearings ranges anywhere from 5000 m² to 78000 m², or 5 to 86 Landsat pixels, or a square pixel grid ranging from 2 x 2 to 9 x 9 pixels.

We understand that there is a difference in whether a spectral signature is identifiable in a set of pixels and the definitions of a spatial typology. The recognition of typology is always independent of scale; the clearing as a typology cannot be identified as a change in the signal readings.

"Although all these methods that use optical sensors estimate the areas involved in degradation, they do not at the same time produce estimates of the amount of biomass (or carbon) lost, nor do they assess the intensity or rate of biomass loss. LiDAR based measurements can provide accurate measurements of features of logging activity such as roads, skiing trails and gaps" (GAO et al. 2020). Approaches of lidar for forest attribute mapping have been reviewed by (COOPS et al. 2021, LOHANI & GHOSH 2017).

In our exploration, we consider the emerging figure of the forest clearing as a new spatial typology (the apparent absence of trees) situated between urban and natural landscapes. The clearing is fleeting – an unstable entity. The occurrence of clearings cannot be detected through sensors and systems as natural cycles, such as the seasonal growth of trees and plants, nor can they be understood in relation to technological cycles, such as satellite or sensor revisit time. The specific metrics of the clearing necessitate us to define the typology in relation to several available datasets. Different datasets may expose a different set of clearings.

4 No Data Without Models

Spatial data models are used to capture a conceptualization of geographic phenomena in a computer system (KITCHIN & THRIFT 2009). Spatial data are continuously produced as part of a spatial data model, although only a fraction of the data may be available to a certain set of users. Model and data are entangled and are dependent on the definition of a set of entities:

- geographic phenomena that are observable and can be abstracted into concepts,
- sensor technologies that can capture these phenomena,
- the capacity of a computer system to process and store the resulting data.

These entities themselves may inherently be unstable and prone to change, either constant or over time. Spatial data may be subject to multiple processes that define or transform the data. It is therefore argued that model and data are inextricably linked. "…without models, there are no data […] no collection of signals or observations – even from satellites, which can "see" the whole planet – becomes global in time and space without first passing through a series of data models" (EDWARDS 2010). Multiple definitions of the forest clearing may be "shimmering" through our data. (EDWARDS 2010) uses the term "shimmering" to describe the inherent instability of data that results from continuous processing.

In our research, we use the term "model" to refer to a system that continuously processes, translates, or distorts a set of data with the aim of generating object-based spatial variables. Assumptions of geometry that are embedded in the models that decode vast point cloud data. We want to give space to the notion that the clearing may have many definitions and depictions that may ultimately be connected to the representation that captures the clearing. The experiments accounted for in the article contribute to the agency of designers by proposing a methodology and workflow to work on different levels of data production and processing.

In their article (M'CLOSKEY & VANDERSYS 2022) discuss the arbitrary nature of land cover classification, a method for delineating a set of land cover types from remote sensing imagery. Standardization in geospatial data processing models may even constrain the emergence of new, or yet unknown, typologies of landscapes embedded in the visions arising from such models. As the present model is incapable of dealing with transitional zones, accounting merely for the absence or presence of trees, we can only use it to determine the boundary of a clearing and determine its dominant shape.

5 Data Stack

Norway has recently completed the largest digital survey in the history of the country, providing lidar laser data for 380,000 km², which will steadily be released through hoydedata.no (TV2 2022). Kartverket provides a continuously updated online status map at (KARTVERKET 2022). The New National Height Model (Nasjonal Detaljert Høydemodell, NDH) produced from the lidar scans will provide the country with one of the most detailed national elevation models to date.

The lidar data were generated with specific aims such as forestry, forest management, and ecosystem surveys; however, this data for the forest might not be collected again unless there is a particular case of use; therefore, we operate under the assumption that the clearings as captured by this dataset even though they will change in time, might not be ever captured again at such high resolution. Recurring cycles of data are higher for photogrammetry; in any case, the clearings as depicted by the survey are in the past, and they will stay in the past; therefore, our methodology perhaps points to the value of the clearings as cultural landscapes with even potential heritage value that might only endure in the lidar captures.

In Norway, the Geodata Act (2010) and the Geodata Regulation (2012) implement the pan-European INSPIRE directive (2007) for geospatial infrastructure. (KOMMUNAL- OG MODERNISERINGSDEPARTEMENTET 2018) provides a good record of the Norwegian government's geodata strategy. Lidar data follows the LAS Specification 1.4 – R15, a global standard set by the American Society for Photogrammetry and Remote Sensing (ASPRS). In Norway, Hoydedata.no gives access to local high-resolution elevation data derived from laser scanning or photogrammetry as raw point cloud data and processed gridded raster elevation data, as well as continuous national elevation data models as gridded raster with a spatial resolution of 1 m, 10 m, and 50 m.

Fig. 3: Depiction of potential clearings based on the Oslo public data landscape

In the transition from urban fabric to forest area, we encounter two datasets that are polar opposites in terms of the density of data points and thematic focus. Felles KartdataBase (FKB) data is a standardized set of geographical information used for planning and design purposes that captures objects and surfaces as detailed vector data. The dataset and its metadata products are available through the national geoportal Geonorge (GEONORGE 2023). The dataset has a gradual decrease in the density of data points from urban regions to rural areas, with forests depicted as flat surfaces. Skogressurskart 16 (SR16), the forest resource map for Norway, is a raster-based dataset focusing on detectable spatial patterns in forests.

(ASTRUP et al. 2019) FKB and SR16 provide the base for developing a model for the clearing as formalized urban forest space, even if their dedicated data formats and definitions don't match our requirements. Both datasets are at least in part derived from lidar data. FKB has a national dataset with a focus on urban developments, design, and legal matters. SR16 is an important tool for forest inventory analysis and forest management.

Both datasets provide national coverage in the framework of their specific data but are opposites in the density of their data points: SR16 only covers areas delineated as forests and provides no data for urban spaces, while FKB has the highest resolution in dense urban areas and a lower level of data points in forest areas. Both datasets aim to create and maintain a national coverage of data. The datasets are continuously updated to register the present state of the environment. They are not designed to have a wide temporal resolution or capture several moments in time.

6 Scouting Digital Clearings

From within the forest, there is no overview of it – a clearing may stay hidden to a human observer until encountering it by walking into it by accident. It reveals itself by walking through the forest. For digital datasets that register the forest it may be the same – the clearing reveals itself through the dataset, and between datasets none may account for the same set of clearings.

Finding, detecting, and measuring the clearing is the starting point in our process of data collection. Considering the unstable nature of the forest clearing, the sites had to be determined through the methods we use to describe them. We utilize the concept of "data scouting" to describe a situation where:

- the metrics for detecting an object of study or spatial typology is closely related to the definitions of geospatial data, and these metrics vary across different datasets or
- the exact location of a site cannot be known other than from a data source.

The lidar dataset is inherently designed as a high-dimensional data stack. Lidar point cloud data may contain a set of x,y,z coordinates, backscatter intensity, color values derived from passive sensors as true-color or infrared RGB color composites, multi- or hyperspectral data, or metadata-level information on the acquisition and processing of the data. Point cloud processing focuses on detectable patterns in this data stack to derive certain data conclusions through the use of specialized algorithms, software packages, or tools. These derivative data may be stored in the same dataset as for point classification codes, or processed as entirely new datasets in vector and gridded raster formats, as for feature vectors derived from object detection or return intensity images.

"Currently, only a small portion of the data in a point cloud scan (less than one percent) is used to produce conventional surveys or documents such as contour plans, elevations, and sections. The remaining ninety-nine percent of the scanned data is seldom used and usually discarded." (GIROT 2019) As for all remote sensing data, resolution, as well as sensor capacities and the process of capturing, may limit or constrain further analysis or processing.

Our scoping region for the forest north of Oslo intersects with three lidar datasets: Oslo Marka 2010 (1 pt/m²), Oslo Kommuneskogen 2010 (10 pt/m²), and NDH Oslo Nordmarka 2016 (2 pt/m²). To allow for complexity in testing our model and overcome eventual thresholds that lower-resolution datasets may impose on feature extraction, we decided to use the most high-resolution data available in our study area – Oslo Kommuneskogen 2010. The dataset was created in six sessions between 08.08.2010 and 01.09.2010 and covers an area in the Oslo Marka amounting to approximately 188 km². A metadata document is available through hoydedata.no at (TERRATEC 2010)

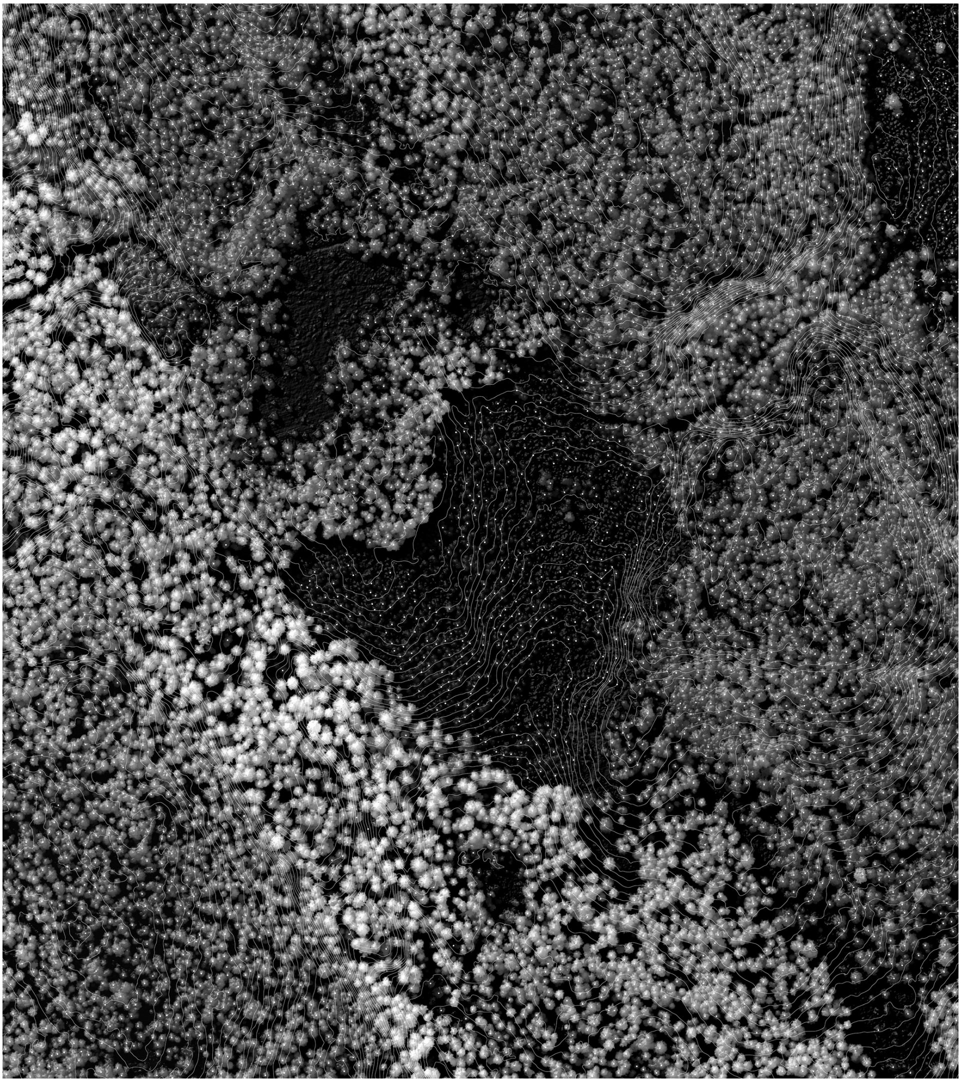

Fig. 4: Image composition for one of the clearing sites. The image is based on lidar-derived CHM data interlaced with feature vectors and elevation contours.

7 Model Sampling – Revealing Clearings

The forest clearing is one of the figures that is absent from the standardization of classification datasets. Accounting for the specific metrics of the clearing necessitates defining specific characteristics that are developed in relation to available datasets focused on the forest. We have tested the hypothesis that certain spatial conditions of the clearing can only be evaluated and fully understood by working directly with the lidar data. Therefore, we apply it to the most high-resolution lidar data available in our study area, Oslo Kommuneskogen 2010.

The point cloud and its derivative products – the raster and the vector – allow for high versatility in approaching the clearing as digital data space. However, each derivative dataset may have unique advantages or disadvantages relative to the specified use cases of the model. Our model for forest clearings is based on sampling the data models of SR16 and FKB and applying their metrics to the Oslo Kommuneskogen 2010 lidar dataset. We made a preliminary selection of 40 sites, from which we selected and processed data for a subset of 26 sites. We produced object-oriented feature vectors and high-resolution Canopy Height Models (CHM) for the selection of 26 sites. The sites become the ground from which our model becomes an expression of formal spatial analysis.

There are numerous methods for feature extraction from lidar data, some of which are proprietary and owned by individual companies or institutions. Delineating individual trees from lidar data can be achieved by identifying peaks in high vegetation points as tree top points, and the downward sloping surface from these points as the extent of the tree crown. The peaks and valleys in the fabric of forest lidar data allow for extracting precise metrics for individual trees.

7.1 Model

The prevalent datasets (FKB, SR16) that are used for registering the peculiarities of the urban environment and forest areas are developed to capture a specific spectrum of sensible objects and surfaces. Through FKB, we understand and study urban structures as objects that can be clearly delineated as vectors, while SR16 rasters are based on detectable patterns in forest regions that are independent of zoning, access roads, or topography. We sample existing data models from the local FKB and SR16 datasets and apply them to our new model: we apply the dense vector data structure of FKB data to the forest and sample SR16 data on the level of the resolution of dense lidar point cloud data.

7.2 Canopy Height Model

Derivative raster data that are commonly produced from lidar point clouds include Digital Surface Model (DSM), Normalized Digital Surface Model (nDSM), Digital Elevation Model (DEM), and Canopy Height Model (CHM) as well as intensity images. Elevation models are produced as gridded raster data. In contrast to 3D point cloud data, gridded raster data are essentially 2.5 dimensional because any grid cell only samples one vertical elevation value (DONG & CHEN 2018). The DEM is created from ground points and the DSM from the highest points within each raster cell (DONG & CHEN 2018).

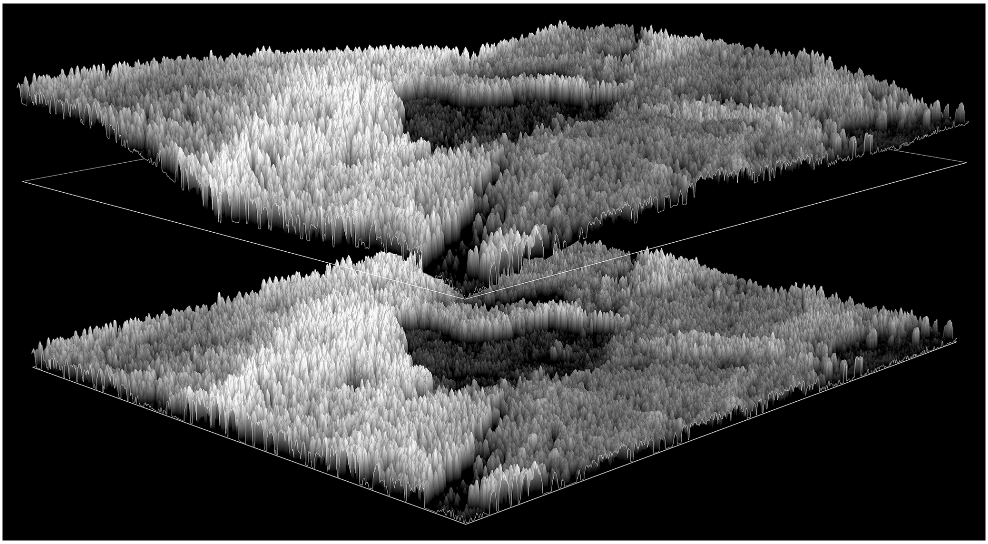

Fig. 5: Comparison of DSM at original elevation (top) and CHM (bottom) with elevation values at +200m. The edge of the forest is clearly visible in both models.

The Canopy Height Model (CHM) is a model commonly used in fields dealing with forestry or forest management. It is "a raster grid that stores the upper surface (i. e., maximum) height of vegetation canopy" (DONG & CHEN 2018), the elevation of trees relative to the ground. The CHM is generated by subtracting the DEM from the DSM. The CHM literally removes the ground from underneath the trees, projecting the root point elevation to an apparent 0 in the coordinate reference system. As a result, the digital model of the forest ground becomes flat. The complex entanglements that make this environment are removed: elevations, slope, and potential drainage flow paths. The CHM, as used for forest management, is identical to the NDSM, used in the context of urban environments. The use of different terminologies for the same datasets produced by the same process indicates how models are context but not data-specific. For our case study, we produced CHM raster datasets at 25cm resolution for all sites.

7.3 Feature Extraction

FKB data registers objects and surfaces as detailed vector data. The dataset has a high density in urban areas and an increasingly lower density in less urban areas. Urban FKB data shows the context and connection of the individual objects and surfaces that are delineated in the data. In the forest, FKB data may show a continuous surface that accounts for the area as "forest" but has no distinction of objects within this environment. We trace trees in the forest as organisms that are in constant interaction. They become the figure in constructing the urban forest. Starting from the urban, we translate the metrics of FKB to the forest and create a set of 3D vector objects that account for the forest as a space of complex interactions and entanglements. We created vectors for: tree root point, crown top point, radius, buildings, and elevation contours for DEM and DSM at a 10 cm interval. A dense collection of vectors that we describe as a "vector cloud".

Fig. 6: "Vector cloud" of lidar-derived feature vectors and elevation contours

8 Digital Forest Clearings

The clearing emerges as an unstable spatial typology resulting from an entanglement of processes related to the forest. First, the spatially dependent, geophysical, bio-chemical, and ecological processes that determine the growth of trees in the forest, and second, processes of forest management. We encounter the forest clearing through geospatial data. The forest becomes a digital asset as part of extractive industries that generate information on forest environments to harvest trees. Data on trees precedes the agency of these industries to transform the forest landscape. Data surveying the forest describe the clearings as the absence of trees in the seemingly isotropic fabric of the forest, rather than a space surrounded by trees. The clearings emerge within the space of the survey as a combination of factors such as forest management and geophysical parameters including elevation, slope, accessibility, and tree height at the time of capture. The clearings do have value as visible remnants of a cultural landscape practice, they are frozen in time by the lidar survey, and this space within the model might be the only space in which the clearings can be studied in morphological detail.

9 Conclusion

The value of this particular case in Oslo is twofold; on the one hand, the databases in Norway for performing such analysis are public; on the other hand, a history of careful urban forest management, reconciling the public use of the forest with the interests of commercial forestry, have developed into unique and delicate ways to perform clear-cutting in the urban forests around Oslo. These two unique conditions converged to present us with the need to perform this study in Oslo; however, the workflow and methodology described here could be employed in other forested areas, as long as the data is available and there is a unique aspect of clear cutting to be valued through images.

As previous authors in the field have suggested, working with lidar-derived point clouds aids in overcoming "limitations of current digital models that restrict site-specific analysis and integration during design processes. The method tested extends the design vocabulary to any formal artifact and interlinks all scales addressed by designers. Digital modeling based on laser-scanning surveys offers new ways to address (urban) landscapes, in which topography can be used as an interface to negotiate ecological, cultural, and spatial design questions." (URECH et al. 2020) To this we add, based on our own research, that the continuous processing of lidar-derived point cloud data does not merely transform, filter, or reproject numbers within a given reference system in order to streamline or derive new design methods, but literally reveals unseen spatial worlds in between signal and data. Our case study in the forest near Oslo goes further not only into testing a methodology for design (CALLEJAS 2022), but in fact, contributes to revealing unseen or undervalued landscapes that exist between signal and data, and that might not have been discussed before as meaningful urban artifacts or potential civic spaces.

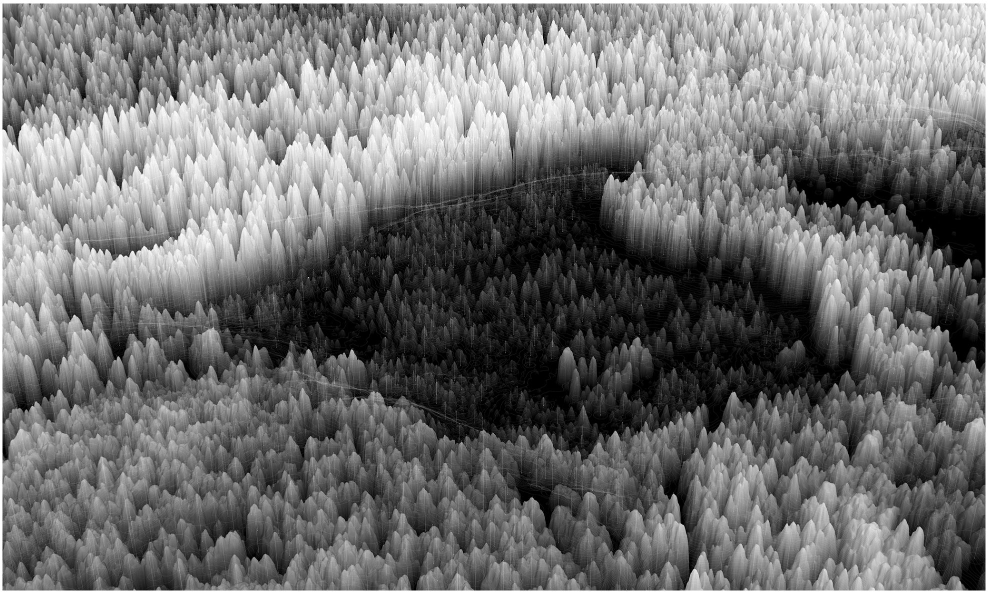

Fig. 7: The forest clearing as data composition of lidar-derived CHM data, feature vectors for trees, and elevation contours

The clearings as visualized within the lidar surveys are, therefore, landscapes in their own terms, with characteristics that can only be understood via the study of the lidar survey as opposed to photography, photogrammetry, or field observations.

Data may be constrained by their embedded models to represent unknown spatial entities. Data curation and scouting may be one part of developing the integration of spatial data into architecture and landscape architecture practice, but we want to put emphasis on the importance of making models that produce and transform data for unique and unknown spatial typologies. Model sampling is our strategy for understanding and extracting the metrics of data models for FKB and SR16 and transferring them to the Oslo Kommuneskogen 2010 lidar dataset.

This work is a precursor to a methodology that allows for a closer creative engagement of architects and landscape architects with the models that are built around forest data. The case study of forest clearing around Oslo could be applied to other locations where there is an assumption of the presence of undervalued landscape entities, particularly remnants of cultural landscapes, as long as high-resolution data is available. This methodology has great potential in the emerging field of cultural landscape preservation or landscape heritage, especially when there is a need for delicate intervention.

As the clearings are in constant transformation due to forestry and natural processes such as succession, the clearings that exist in the survey are always in the past. The methodology exposes the limitations of performing analysis as the cycles of high-resolution data acquisition are too slow to depict reality. The idea that we always operate with the past rather than the present of a landscape is not only a limitation, as it exposes the need to be able to "manipulate" malleable models when discussing this workflow as projective rather than purely diagnostic.

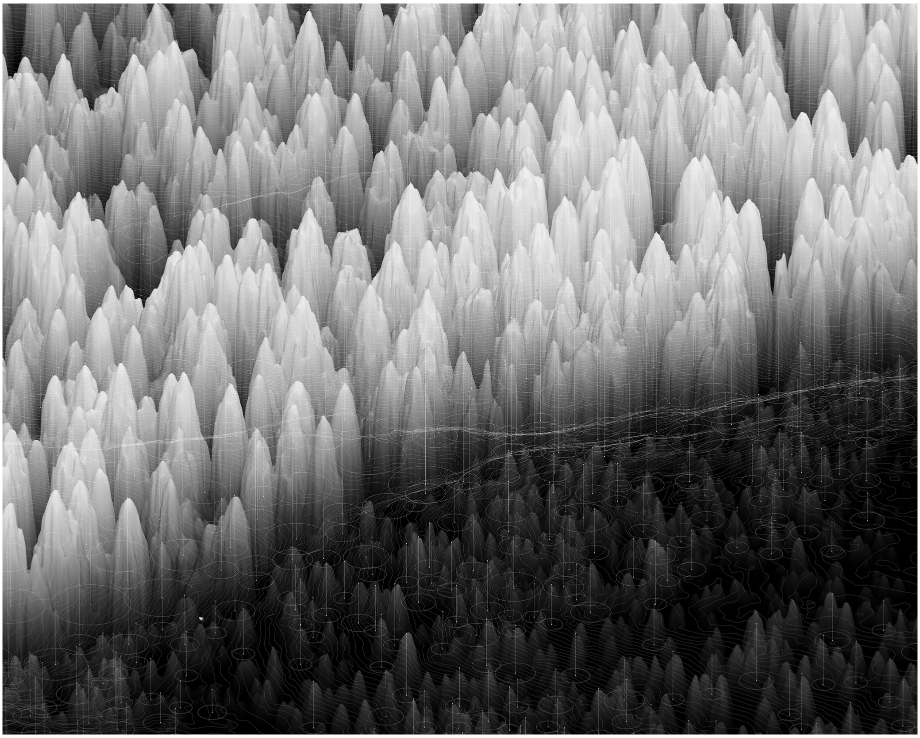

Fig. 8: The edge of the forest clearing. Data composition for one clearing site, consisting of lidar-derived CHM data, feature vectors for trees, and elevation contours.

Models may operate as unidirectional filters, allowing to transform high dimensional data to less complex derivate data products. In the case of land cover classification, complex earth observation images may be reduced to images of a predefined set of material categories, where it is not possible to derive the former of the latter. Land cover classification data are programmed to allow for the interpretation of changes in the surface of the earth, within the framework of a given classification system, where each system produces individual data products that are not comparable to the ones of another system. It may not be possible to extrapolate from the classification data to the remote sensing observations used to produce it, or even to the ground truth condition they aim to capture.

The application of the methodology elsewhere might be limited by the following factors: data availability and temporal or spatial resolution of the data. The analysis of the data is in tune with the relative low speed and intensity of forestry in the urban forest north of Oslo; therefore, spaces can be "discovered" and valued in the data space before radical changes occur in the real site. Another limitation is that this methodology, however useful for delineating and framing clearings, does not offer enough resolution to study natural succession at the clearings' edges, as this phenomenon happens at a different scale and pace compared to the maturing of trees and forestry. This limitation was exposed by some of the experiments with master students that wanted to go into more detail to address the clearings' edges subject to natural succession.

Design disciplines have little agency over how remote sensing systems are constructed and how data is collected, processed, and made accessible, but the constantly increasing amount of open data demands designers to develop their own interpretative and operational models as a response. This research is an example of a designer´s approach to such interpretations.

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