**Zeitschrift:** Pamphlet
**Herausgeber:** Professur für Landschaftsarchitektur, Christophe Girot, ETH Zürich
**Band:** - (2018)
**Heft:** 22: Rift : 7.5 views on the Jordan Valley

**Artikel:** Sightlines and surveillance
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**DOI:** https://doi.org/10.5169/seals-984635

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# VIEW #6
# SIGHTLINES AND SURVEILLANCE

*Philipp R.W. Urech*

At the core of its geographic definition, the territory represents the relation between a subject and a space. This relation is first established by a process of appropriation which, on a spatial basis, is an act of delimitation.[1] Drawn with the idea of a limit in mind, the territory becomes an informed space where the control of resources leads to the necessity of power.[2] Throughout the history of sedentary cultures, the control of the territory played a fundamental role in the assertion of a society and physically marked its landscape with a crisscross of modulations such as roads, water management, or defense which respond to specific managerial functions. In a further form of control, topographical knowledge evolved into a science of military warfare that may give tactical advantage to one belligerent over the other, determining the outcome on the battlefield. To no surprise, most methods of field evaluation are born from military purposes, either to methodically overcome the obstacle or to yield the advantage of the ground. Terrain becomes a fundamental asset: in guerrilla warfare, to successfully defend against a stronger foe, and in reconnaissance missions to explore behind enemy lines.[3] Mapping has evolved accordingly, relying on progressively more sophisticated tools of geodetic surveying that range from the plummet to the plane table to the theodolite, so that battles in World War II were already fought in predetermined orthomorphic projections and grids.[4] While levels and triangulations in the landscape historically coincided with the sightline of the surveyor, the development of electronic tools in the past decades have extended the surveyor's reach beyond the very limited ability to stand in the field and see. But whether through the eye or through the electronic sensor, the purpose remains the same: to gain control of territorial information by carefully reassembling an intelligence of the landscape, sensing its physical nature through the layering of time, and finally reproducing it in a more tangible

1 Claude Raffestin, "Elemente zu einer Theorie der Grenze" (original: "Eléments pour une théorie de la frontière," 1986) in *Claude Raffestin – Zu einer Geographie der Territorialität*, ed./trans. Francisco Reto Klauser (Stuttgart: Franz Steiner Verlag, 2010), 57–58.

2 Raffestin, "Elemente zu einer Theorie der Grenze," 68–69.

3 Peter Doyle and Matthew R. Bennett (eds.), *Fields of Battle: Terrain in Military History* (Dordrecht: Springer, 2011), 51–62 and 311–324.

4 Doyle and Bennett, 171–204.

medium. In a certain sense, the landscape mirrors the course of history and its evaluation reveals an intricate patchwork of alterations throughout time. The landscape of the Jordan Rift Valley is no exception as it bears innumerable traces that witness the heritage embedded in its ground: a web of ancient trade routes dotted by the remains of monasteries and caravanserais, railroads and settlements ranging from ancient fortresses to more recent kibbutzim strategically positioned to defend the sovereignty of the land. While many historical traces lie idle in the form of ruins and topographic artifacts, today the landscape is most noticeably marked by interventions aimed at controlling water, harvesting the rare resource to irrigate agricultural lands, and therefore add to the geopolitical tensions between the states sharing the Jordan River's resources.

## The Hill as Panopticon

In January 2016, a team from the Chair of Professor Christophe Girot visited the hydroelectric power plant in Naharayim, located on the border between Israel and Jordan, on a mission to document its architecture and landscape. The site is located eight kilometers south of the Sea of Galilee, situated between the confluence of the Yarmuk and Jordan Rivers and the kibbutz Gesher. The scope of the power plant coincides with this extent and is composed of a retention basin covering an area of ninety hectares, earth and concrete dams provided with several sluice gates and spillways, one bypass, and one headrace channel with a few bridges and other facilities. While the premises's state of decay has evolved into a palette of shrubs and grasses gradually gaining ground on the concrete devices that once managed the flow of water, a trained eye would eventually recognize the original function of the modulations structuring the topography. Proceeding with methods developed at the Chair of Professor Girot and its associated Landscape Visualization and Modeling Lab (LVML),[5] we set out to decipher the founding intelli-

5 Implementing a precise use of instruments in the field allowed instructors and researchers at the Chair to refine perceptions of the landscape and to apply the techniques to landscape architectural design. Proceedings are documented in *Field Instruments of Design*, Pamphlet 19, eds. Christophe Girot and Ilmar Hurkxkens (Zürich: gta Verlag, 2015).

gence of the site. This is why in addition to our cameras, video recorder, and fixed-wing unmanned aircraft equipped with a camera for photogrammetry, we brought a long-range terrestrial laser scanner[6] that would enable us to record a detailed three-dimensional imprint of the physical structure of the landscape. As designers, we rely on observation and operate various field instruments to aid us in reading our objects of study more closely. The support of instruments is necessary in overcoming boundaries of scale, time, or visibility. A very first step would indeed be to delineate with a pen on paper the contours of physical objects—a fundamental process for establishing the principles embedded in their forms. Leonardo da Vinci followed the same method by drawing dissections of the human body in his quest to trace the physiognomy back to the anatomy of man. Similarly, the process of tracing back an architecture to its tectonics, or a landscape to its topology, is first and foremost an exercise in reading and interpreting.[7]

Taking up the cinematographic term "scopic regime," architect and theorist Georges Teyssot describes human beings as *animaux-à-fenêtres* ("animals with windows") who depend on optic devices to connect with the world in which they are immersed.[8] He refers to Leon Battista Alberti's drawing grid as an apparatus to frame and direct the gaze in becoming an asymmetric relation between the subject and the observer. Any apparatus of sensitive or intellectual nature induces indeed a gaze polarized by its "lens." The notion of an asymmetry in the gaze can be found in contexts that generate ways of gaining intellectual control over the world, such as museums, botanical and zoological gardens, land surveying, and mapmaking. The asymmetry becomes more evident when speaking of the "medical gaze," a term coined by Michel Foucault to describe the hegemony of medical knowledge that he recognized in the relation between doctors and patients in which doctors impose a

**6** We employed the 3D TLS VZ-1000 laser scanner by Riegl with a measurement rate that reaches up to 122,000 points/sec. at a radial range of 1400m, and a mounted DSLR camera to capture color information.

**7** Christophe Girot, Albert Kirchengast, Anette Freytag, Suzanne Krizenecky, and Dunja Richter (eds.), *Topologie—Topology*, Pamphlet 15 (Zürich: gta Verlag, 2013).

**8** Georges Teyssot, *A Topology of Everyday Constellations* (Cambridge, MA/London: The MIT Press, 2013), 252.

medical diagnosis on their patients.[9] The medical gaze establishes a certain power dynamic through the unequal relation between the person who knows and the person who does not know. Devices of surveillance, in particular, exploit this dynamic to develop disciplinary and self-regulating mechanisms. They are formalized by Jeremy Bentham's panopticon in which an inequality is fabricated by the spectator who observes without being seen, levering his or her gaze into a tool of power.

Relieved from the derogatory connotation of surveillance that is suggested by the medical gaze, our role as surveyors operating within the discipline of landscape architecture is nevertheless to cast a gaze trained for the collection and examination of spatial information in the field. With an area of one thousand hectares, the site at Naharayim required us to employ tools capable of operating efficiently at the territorial scale. To produce a point cloud model of good resolution and coverage, the long-range terrestrial laser scanner needs to establish a panoptic stance in regards to its surroundings. Minimizing visual occlusions while scanning from as few positions as possible means that the scanner, like the focal point of the panopticon, needs to be positioned with care in order to be most effective. The recording of a territory is done from a fixed point. From there the terrestrial scanner draws transects radially around its position. The same operation is then performed from the next vantage point so as to fill in areas which were hidden in the previous scan. As the operation is repeated over and over again, a digital model is being tailored from the physical attributes of the site—tied to a precise moment in time. By personally operating the remote sensing, we gain the flexibility to collect data which is most up to date and are even able to document ephemeral and perennial characteristics by repeating surveys over a period of time. Furthermore, by steering our gaze to decipher the composition of the landscape, we gain an intellectual control of the territory. It is no coincidence that some scanning locations we chose in Naharayim corresponded to the military watchtowers positioned on the hills

9 Michel Foucault, "Seeing and Knowing" in *The Birth of the Clinic: An Archeology of Medical Perception*, trans. A.M. Sheridan (Abingdon: Routledge, 1976; originally published in French under *Naissance de la Clinique* by Presses Universitaires de France, 1963), 120–121.

along the Jordanian-Israeli border as their sightlines intertwined space with power. Even if the scans contain the borderline barriers designed to impede access and view, the combined model goes beyond the geopolitical seizure and disrupts the perception of territorial control. The model virtually unifies a segregated landscape, reconstructing a continuity lost by the friction of interests and ensuing conflicts. The alluvial slopes of the Jordan River—presently a *terra nullius* occupied only by stray dogs and wild boars who defy the last mines still buried in the river's sediments—may be reunited by reforming the gaze by which each side is perceived today.

## Seeking the Vanishing Point

Confined by security constraints rather than by some didactic procedure, we asked our students in the course Scales of Power[10] to work with the point cloud model—previously recorded by our team in the field—without first visiting the site. Defying architectural canons which dictate the necessity for site visits, our students worked solely with the photographs, films, and models that we made available to them. In this way, the exercise emphasized reading a 'virtual' site framed exclusively by viewing devices. Interpreting this virtual landscape also requires the development of new modes of perception since the landmarks which we rely on in the field at the human scale are no longer the same. Media, however, have the merit of refining our perception, thus allowing us to develop a more critical eye. A close reading allows the surveyor to understand the territory's physical attributes and to retrace the dynamism and inertia affecting the terrain. It can be understood that by applying the instruments it is not only the object of knowledge that is constructed, but also the cognoscente. The point cloud model—basically an array of XYZ coordinates—is a neutral replica of the site's spatial composition; its interpretation is a subsequent step, directed by the implemented discipline. Choosing the right instruments for the desired model at the outset is necessary in order to overcome

**10** The elective course was taught by Prof. Christophe Girot and assistants Ben Gitai, Ilmar Hurkxkens, and Philipp R.W. Urech at the Institute of Landscape Architecture (ILA), ETH Zurich, September–December 2016.

the limits of scale, time, and visibility, and to make them tangible to our senses. These limits are best explained through these well-known examples:

*Scale*

A famous illustration by Aldo van Eyck describes a tree as equivalent to a leaf and the city as equal to a house.[11] This analogy declares a structuralist transfer between scales (organizing the city as a house) while also drawing its significance from the sheer act of abstraction (by reducing the city to the scale of a house). The territory is an abstract notion the extent of which can only be grasped by an operation of scaling. Without a shift in magnitude, we would not be able to interpret a site the scope of which requires us to work with instruments and models. The power plant and the Haifa–Dera'a railway line were set into the topography of Naharayim using cartographic scaling methods. A scaling tool, whether analog or digital as with the point cloud, is again needed to decipher the arrangement of their traces.

*Time*

The timeline of a landscape dwarfs the human scale of time. Most landscapes do not demonstrate their own formation in a tangible performance but are readable by geologic or cultural signs which may be traced through history. In their short film *Powers of Ten*, Charles and Ray Eames link space to time by a logarithmic acceleration of the camera's movement. In a way, time becomes the measure of scale. Each scale therefore establishes a different spatio-temporal relationship with the energetic and gravitational dynamics that intervene in their order of magnitude. A model distorts this relationship and allows us to objectify the gaze. The alluvial slopes of the Jordan River should be read to be ephemeral like a hand-drawn curve, as their physical form represents merely a temporary state within a perpetual process.

**11** Hand-drawn diagram prepared by Aldo van Eyck for *Domus* (May 1965) in *Collected Articles and Other Writings, 1947–1998 / Aldo van Eyck*, eds. Vincent Ligtelijn and Francis Strauven (Amsterdam: SUN, 2008), 443.

*Visibility*

In his anatomical studies, Leonardo da Vinci conducted experiments on the functions of the human eye. This research led him to invent the anamorphic projection in which an object is projected from a point so close to the painted surface that the object is unrecognizably distorted from a typical perspective and, in fact, only recognizable by aligning one's eyes with the original focal point.[12] An object is not necessarily understandable because it is visible. Similarly, the vision of the naked eye differs from the vision acquired through a point cloud model in which simple changes in perspective, filtering, or coloring can already reveal previously concealed features. Using this technology, we were able to recover from the virtual riverbed the first Hejaz railway bridge which once spanned the Yarmuk. Concealed in thick grasses, it had been utterly unrecognizable to us during our visit to the site. In the point cloud model, we were then able to simulate its former position.

Today, the ubiquity of scaling tools in everyday life seems to trivialize these observations. Yet the difficulty of fully comprehending an extensive site remains a considerable obstacle even amongst experts within the field of landscape architecture and related planning disciplines. With the support of the point cloud model, the students of the elective course were able to master these constraints and to develop themes only by modulating the model's visualization. The synthesis of their observations was done by reproducing the landscape through the medium of images. The objective of the course was to assemble a visual atlas which would highlight specific aspects of the site such as the topography delineating the Island of Peace[13]—unrecognizable as such today due to the absence of water—or the infrastructure bridges within their contextual narrative. We chose common orthographic projections such as plan and section to synthesize the landscape in diagrammatic representations as a way of finally extracting and quantifying its peculiarities.

**12** James S. Ackerman, "Leonardo's Eye," *Journal of the Warburg and Courtauld Institutes*, vol. 41 (The Warburg Institute, University of London, 1978), 108–146.

**13** The Island of Peace is a park area situated at the confluence of the Jordan and Yarmuk Rivers under Jordan's sovereignty but with Israeli private land ownership rights.

Major assets for the visual communication were also the perspectives and section-perspectives. They complemented the diagrammatic representations through a traditional visual construction using vanishing points.[14] Although generating these representations occasionally required a long process of sampling, cutting, or filtering the point cloud model, the basic information remained faithful to the data's origin throughout the process. Since each point is geolocated and corresponds to a specific point on the physical terrain, our work consisted in applying transformations to our gaze; the model itself remained as intact as the light captured on the membrane of a photographic film.

The methodology applied during the survey and the reading of the site at Naharayim demonstrated that the technique of laser scanning lends itself well to building up topological knowledge. In the domain of landscape architecture, where a thorough site reading is a fundamental step for any subsequent concept development, it delineates the natural hierarchy between the elements within the landscape and so prepares the foundation for a design hypothesis. Assembling a virtual model of the site across the Jordan River using the sightline of a laser scanner allowed us to construct our own virtual line of sight with an elaborated affinity for a large spectrum of observations.

**14** See a sample of these section-perspectives in the booklet's centerfold visualization by course participant Michael Thoma