

When the Landscape is Leveled

The Significance of Aerial Photography for Interventions in the Landscape

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As the Ice Age drew to a close, meltwater carried enormous quantities of clay into the sea. The landscape subsequently rose, and rivers began cutting into the bare clay plain that emerged from the water. A network of valleys was carved into the clay deposits, after which small plants, and eventually shrubs and trees, spread across the undulating terrain. Finally, animals and humans followed.[1]

This brief yet concise description of the development of the ravine landscape can be found in Sverre Solberg's *Ravines: Eastern Norway's Jungle* (2019). Until the middle of the twentieth century, those who lived in this hilly terrain had found ways to inhabit and cultivate it. Demands for greater agricultural efficiency, combined with the use of bulldozers, radically transformed this Ice Age landscape. The ravines were flattened and converted into gently sloping fields. In Gjerdrum, 60 percent of today's agricultural landscape has been levelled. Two aerial photographs of the Gjerdrum landscape, one taken by Widerøe's Flyveselskap in 1949 (Fig. 1) and another taken by Sverre Solberg in 2018 (Fig. 2), reveal just how dramatic this transformation was. In the photograph from 1949, all the curves and folds of the cultivated land are visible; in the more recent image, these have been replaced by large fields shaped into broad, gentle arcs. Tracks left by agricultural machinery running in straight lines can be seen across the fields.

Like many others, I awoke on 30 December 2020 to the terrible news that a clay landslide had occurred in Gjerdrum. I remember the television images of a car standing at the edge of the slide with its lights still on, the enormous crater filled with clay, fragments of buildings, and collapsed houses. Everything the unimaginable forces of nature had swept away. In the days that followed, I watched news broadcasts covering the search for survivors and, eventually, the recovery of those who had died. There were stories of homes abandoned in haste and of animals left behind in barns. Infrastructure had been destroyed, and chaos prevailed. Rescue operations and search dogs combed the area.

Now, four years later, I sit trying to understand the event and the landscape of Gjerdrum through documentation, reports, and aerial photographs taken at different points in time. I read about the landscape, but realize how difficult it can be to understand and experience a place without having visited it and seen it with one's own eyes. The landscape is also very different from the one I know on Norway's west coast. Yet, as the opening quotation suggests, the history of the ravine landscape is one of the keys to understanding why this catastrophe occurred.

The landslide itself was the result of a series of factors, among which prolonged and intense rainfall was crucial in triggering the clay slide.[2] Other factors also played a role, although they were not direct triggers: housing development, streams and rivers that had been channelled into pipes, and, not least, the levelling of the ancient ravine landscape.

The Gjerdrum disaster is one of many examples demonstrating that the combination of numerous large and small human interventions in nature, together with uncontrollable natural forces, can be a highly dangerous mix. The causes of the landslide have been thoroughly investigated in several reports. What concerns me here is how photographs can help us gain insight into the landscapes around us. Can photographs of a landscape also contribute to unwanted human interventions?

Ever since its invention, photography has been used to map landscapes. As early as the nineteenth century, it was employed to acquire knowledge about mineral resources, geology, water reserves, and possibilities for settlement.[3] Later, aerial photography was used to produce more accurate maps of land areas. It became an important strategic tool in warfare, but also in the colonization and control of new territories.[4] In 1946, Helge Skappel, one of the pioneers of aerial photography, stated that it was difficult to build a society without maps and plans in the proper dimensions. Such an overview, he argued, should form the basis of a "healthy and rational social development." [5]

According to the art historian William Wessel Nore, aerial photography was used together with cartography and statistical knowledge to describe agricultural landscapes and establish connections between rural and urban environments. It also served as a basis for implementing changes and interventions. Nore distinguishes between vertical aerial photographs and oblique aerial photographs. In vertical photographs, the landscape is photographed directly from above, causing it to appear abstract and flat. Oblique photographs are taken at an angle and much closer to the ground, making details and spatial dimensions such as farms, fences, variations in elevation, and the relationship between cultivated and uncultivated land visible. The two forms of aerial photography served different purposes, yet both were central to several agricultural reforms after the Second World War.[6]

On the website *Norge i bilder* ("Norway in Pictures"), [7] one can study a series of vertical aerial photographs of Gjerdrum and observe some of the transformations the landscape has undergone since the mid-1940s. One can see how a landscape of farms and fields gradually acquired housing developments and new roads. Yet when the images are compared, the changes do not initially seem dramatic. The earliest aerial photograph available on the website was taken in 1946, before the ravine landscape began to be filled in and levelled. However, these vertical photographs reveal little of the enormous transformation that is so visible in the oblique aerial photographs from 1949 and 2019 described above. Although the landscape in 1946 was anything but flat, it appears so in many of the vertical images.

The most striking change visible in these photographs comes after the landslide of 2020, where the enormous landslide crater appears as a vast grey area (Fig. 3). The scale becomes apparent when one notices how small the houses and roads appear in comparison. Another aerial photograph from 2007 (Fig. 4), which bears visual similarities to the image of the landslide crater, dates from the period when the nearby housing development, later affected by the disaster, was under construction. The green surface has been scraped away, exposing sand and grey stone masses. Looking closely, one can see the tracks left by bulldozers in the sand and gravel on the construction site.

What, then, lay behind this radical transformation of the landscape? The industrialization of agriculture during the 1950s and 1960s marked a break with an agricultural tradition that had

endured for thousands of years.[8] Large agricultural machines such as tractors, bulldozers, and combine harvesters came into use. This made it possible to carry out changes more rapidly, and farming shifted from being a collective endeavor performed by rural communities to becoming something that could increasingly be managed by individuals using machines.[9]

The levelling of the ravine landscape was supported by favorable state loans and was justified by the belief that farming would thereby become simpler and more rational.[10] Interestingly, the Gjerdrum landscape was not levelled immediately. It was so rugged that planners had to wait for the next generation of bulldozers, which were larger and more powerful.[11] In 1971, an additional policy instrument accelerated the process. Instead of loans, direct state subsidies were provided for land levelling.[12]

At the same time, Norwegian agriculture was governed by strong state directives, notably the so-called "channelization policy," which remains in effect today.[13] In simple terms, this policy promoted grain cultivation in the flat agricultural districts of Eastern Norway and Trøndelag, while grassland and grazing areas were concentrated in the less productive regions of Western and Northern Norway.[14] In addition, the Land Act of 1955 introduced extensive rationalization measures that allowed the state to purchase and merge farms in order to create economically viable units.[15]

Aerial photography was an effective tool in this comprehensive restructuring. The recording of landscapes through photography could provide the foundation for large-scale intervention and governmental management.[16] Vertical aerial photographs were particularly useful for reforming the complex patterns of land ownership in rural areas. From the air, it was easier to determine what constituted sensible property boundaries.[17] They could also be used to analyze soil conditions.[18] Oblique aerial photographs offered a more intimate view of the landscape and made differences in elevation far more visible, factors that mattered both for cultivation and transportation.

Against this historical backdrop, the before-and-after oblique aerial photographs of the ravine landscape in Gjerdrum become politically charged images. By this I mean that they could be used to argue in favor of major landscape transformations in the post-war period. I do not know whether the 1949 photograph of Gjerdrum was used in this way, but Wessel Nore convincingly argues that aerial photography, together with statistics and cartography, supported the Labor Party's ambition of rationally developing the productive capacities of the nation through new knowledge and modern technology.[19]

One might therefore argue that it is difficult to imagine the extensive transformation of the Norwegian landscape without aerial photography. Although these decisions were made according to the knowledge available at the time, it is clear that the consequences were not exclusively positive. Aerial photographs were also used to map peatlands for fuel extraction, to plan forestry operations, and to design new roads.[20] They thus became important tools in carrying out interventions in nature that are highly contested today.

Today, Widerøe's 1949 photograph of the ravine landscape also serves as a reminder of a landscape that was lost nearly seventy years ago. This loss concerns former cultures, biological diversity, and perhaps also knowledge about the landscape's own capacity to absorb rainfall

through its hills and natural waterways. At the same time, it is important not to overlook the human dimension. Extensive land levelling probably enabled the farmers of Romerike to cope with state demands for a rapid transition from grass production to grain cultivation. It also marked the shift from haymaking with horses and carts to farming with large agricultural machines.

Returning finally to the Gjerdrum landslide of 2020, it was ultimately the enormous volumes of water that caused the ground to fail and houses to collapse. In addition, a range of other interventions, including land levelling, drainage, and construction activity, may have reduced the landscape's ability to handle large quantities of water. What I have sought to highlight in this text is how aerial photography has been used, and continues to be used, in planning such potentially harmful interventions in the landscape. The landslide had tragic consequences and claimed many lives. Looking ahead, one may hope that the disaster can prompt reflection on how human interventions, both large and small, can pose risks to both people and nature.