

## **On Prospecting: Visual Culture between Extraction and Speculation**

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### **Abstract:**

In its narrow sense, prospecting is defined as the search for mineral deposits with a view to exploit them for financial gain. In the last few decades, this definition has been expanded to include bioprospecting, in which genetic resources are transformed into proprietary knowledge —frequently at the expense of communities who have cultivated this knowledge over generations. Prospecting is therefore inescapably extractive, but insofar as it involves a gamble on the profitability of a resource in the future, it is also inherently speculative. Taking recent discussions of the ‘extractive view’ as its starting point, this article focuses on the role of visual culture in prospecting. It investigates how the search for resources generates a visual culture of prospecting and a visual culture about prospecting, whether through aerial views of resource frontiers, spectacular images that attract venture capital, or ‘specimen views’ that isolate objects of economic interest. Tracing a path from the nineteenth-century survey photographs of Timothy O’ Sullivan to contemporary work by the likes of Edith Morales and the group On-Trade-Off, it demonstrates how artists repurpose and diversify the visual culture of prospecting, documenting the forces at play in the struggle over lithium extraction, or investigating the methods by which genetic raw materials are turned into patentable commodities.

### **Keywords:**

**Extraction, Mineral Prospecting, Bioprospecting, Speculation, Visual Culture, Verticality, Contemporary Art.**

## Introduction

Figure 1. Timothy O'Sullivan, *Karnak, Montezuma Range, Nevada* (1867) Plate 23 from Clarence King, "Systematic Geology: Geological Exploration of the Fortieth Parallel, Vol. 2: Descriptive Geology." (Washington, D.C. 1877), p. 763.

In the spring of 1867 the Geologist Clarence King embarked upon the first of several ambitious surveys of the American West. Charged with documenting that 'belt of country' that ran along the fortieth parallel from Nevada to Colorado, King took with him a team of nine specialists that included a botanist, a topographer, a zoologist and a photographer named Timothy O' Sullivan.<sup>1</sup> While the group's expertise was mostly scientific, the aims of the expedition were heavily influenced by commercial factors, with a focus on the productive capacity of the landscape and its untapped reserves of silver and coal. In this respect it is telling that of the seven volumes of King's magnum opus published after his survey expeditions, the first to appear was not volume one, but volume three, simply entitled *Mining Industry*.<sup>2</sup>

Many of the photographs O'Sullivan took on these surveys have since acquired the status of highly prized aesthetic objects; their depictions of magisterial canons and ancient geological formations attracting the attention of subsequent photographers such as Ansel Adams. And yet however beautifully they captured the rugged terrain of the American West, these images also went hand in hand with the aims of scientific, economic, and colonial exploitation. As well as possessing undeniable aesthetic merits, O'Sullivan's photographs are fine-tuned to portray a frontier charged with the promise of untapped potential, and many of the photographs he produced between 1867 and 1874 were of direct benefit to future mining and military endeavours.<sup>3</sup> For this reason they can be viewed as early examples of what could be

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<sup>1</sup> Jurovics, "Framing the West: The Survey Photographs of Timothy H. O' Sullivan," 15. This number does not include support personnel or the group's military escort.

<sup>2</sup> King, *Systematic Geology*, vii.

<sup>3</sup> From 1871-1874 O'Sullivan also took part in another survey led by George M. Wheeler, whose aims included gathering information on "the numbers, habits, and disposition of the Indians [...], sites as may be of use for future military operations or occupation, and the facilities offered for making rail or common roads." Letter

called ‘visual prospecting’, a form of image-making that enables, expedites, and sometimes critiques the pursuit of future profits by means of extraction.

In this article O’Sullivan’s survey photographs are used as a springboard that launches into a discussion of the visual culture of prospecting today. Despite the temporal disjuncture, these faded photographs of the American West are nevertheless connected to more contemporary images of extraction in a number of ways. O’Sullivan’s work provides more than a historical backdrop to this contemporary work; it helps to demonstrate that many of the drives and representational forms of visual prospecting have remained remarkably constant over the past 150 years. It also serves to reveal an important feature of prospecting: that it is rarely the preserve of individuals working alone. As surveys like Clarence King’s demonstrate, prospecting more often involves large, coordinated efforts in the search for resources, which are themselves bound up in wider infrastructures of knowledge production of which vision and visualization are key components.

In its traditional form, prospecting is situated at the point where geological knowledge and economic motivations coincide.<sup>4</sup> In more recent decades however, the word has also come to be used in a more directed sense, principally in practices of ‘bioprospecting’, which involve the search for biological and genetic resources, almost always through forms of dispossession.<sup>5</sup> Whether the material in question is obtained by clawing minerals from the ground or from mining traditional ecological knowledge, in each case the process sits somewhere between extraction and speculation, constituting an informed guess on where profit might be gained in the future. In this respect, prospecting is characterized by its persistent attempts to look ahead, underpinned by an epistemology that reduces the world to a basket of undiscovered resources in the present.

As a noun, a ‘prospect’ is also an inescapably visual concept, closely linked to practices of viewing a landscape that enable an overview, or an extension of the typical range in which

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from Glen Andrew A Humphreys to George M. Wheeler, March 23, 1871. As reproduced in Humphreys, *Preliminary Report Concerning Explorations*, 11-12.

<sup>4</sup> The instrumentalization of geological knowledge is evident in the field of economic geology, which took shape towards the end of the 19<sup>th</sup> century. Today it lays claim to being a ‘predictive science’ that has the capacity to anticipate the location of undiscovered mineral deposits through technologies such as machine learning. Jébrak, ‘Economic Geology: Then and Now.’

<sup>5</sup> While the word bioprospecting is relatively new, its practices stretch at least as far back to the advent of colonial botany in the early modern period. Schiebinger and Swan, *Colonial Botany*.

vision operates. In analysing the visual culture of prospecting, this article stays within the orbit of this meaning, and by attending to the diverse ways in which prospecting manifests, it offers something of a panoramic view that resists the temptation to narrow its focus on any one material or visual technique. While the next section attends to the historical association between prospecting and the view from above, the diversity of examples that follow is intended to complicate the idea that prospecting necessarily requires an overview, or that the view from above is always a harbinger of resource extraction to come. By shuttling back and forth between a broader visual culture of prospecting and specific works of art by the likes of Edith Morales and the group On-Trade-Off, the aim is to loosen the association between the overview and what has been called the “extractive view”, highlighting the diversity of contexts in which the visual culture of prospecting manifests.<sup>6</sup> O’ Sullivan’s photographs provide a useful first step in this direction, since they are images that facilitated resource extraction well before the aerial view had become the ubiquitous phenomenon it is today. The selection of examples in what follows further pluralize the extractive view, whether through representations of the subsurface of the earth, images designed to attract speculative capital, or those that isolate representative ‘specimens’ by means of standardised visual conventions.

### **Extractive Views**

From the high ground prized by generals on medieval battlefields, to the strategic advantage afforded by access to satellite technologies in the twentieth century, there are numerous examples of a mutually reinforcing relationship between the aerial view and forms of power and domination. Despite its frequent claims to objectivity and neutrality – or what Haraway influentially called the view “from nowhere” – the aerial view has acted as both a perspective on the world and a powerful instrument for changing it.<sup>7</sup> The literature on the topic is large and diverse, and often frames the issue in terms associated with military and state power.<sup>8</sup> There is also a sizable body of work that looks at the role of the aerial view in the reconfiguration of land and ecosystems as inventories of resources, a process intimately attached to colonial violence.<sup>9</sup> A key reference here is James C. Scott’s discussion of

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<sup>6</sup> Gómez-Barris, *The Extractive Zone*, 133

<sup>7</sup> Haraway, “Situated Knowledges”, p. 589

<sup>8</sup> A selection of this literature includes Virilio, *Speed and Politics*; Grosscup, *Strategic terror*; Gregory, “Lines of descent”; Weizman, “The politics of verticality”; Weizman, *Hollow land*; Elden, “Secure the Volume”; Rose Shell, *Hide and Seek*; Adey, Whitehead, and Williams, *From Above*; Kaplan, *Aerial Aftermaths*.

<sup>9</sup> Cosgrove, *Apollo’s Eye*

attempts to establish a scientific approach to everything from forest management to urban planning, which first of all required the ability to ‘see like a state’.<sup>10</sup> It is largely by means of these tributaries that discussions of the aerial view enter the Environmental Arts and Humanities, where it is couched in various terms as a ‘God’s trick’, ‘premonitory perspective’ or ‘extractive view’.<sup>11</sup>

To take two recent examples, in his analysis of the large-scale aerial photographs of Edward Burtinsky and Louis Helbig, T. J. Demos speaks of the complicity of the artists’ work in “dramatizing in spectacular fashion the perverse visual beauty of a technological, and even geological, act of mastery devoid of environmental ethics.”<sup>12</sup> Demos suggests that the aerial perspective (albeit often an oblique one in Burtinsky’s work) obscures the wider socio-economic effects of extraction, presenting a depopulated resource frontier seemingly unconnected to both the local and global economy. Aerial photographs of the California oil fields or the Alberta tar sands are explicitly contrasted with a photo exhibition entitled *Petrochemical America* by Richard Misrach, which, for Demos, shows “on-the-ground environmental and human costs.” Whereas the aerial view and remote sensing tend to “fetishize mastery of the visual field,” there is an implication that this tendency can be undercut by images, like Misrach’s, that show the ravages of extraction from a more terrestrial perspective.<sup>13</sup>

In a similar vein, for Macarena Gómez-Barris, it is by focusing on “extractive capitalism and its vertical model of seeing” that we can better understand the ways in which colonial and state violence is strengthened through visual regimes. Drawing on colonial and environmental histories, particularly in Latin America, Gómez-Barris repeatedly associates “vertical seeing” with “colonial visual regimes that normalized an extractive planetary view that continues to facilitate capitalist expansion, especially upon resource-rich Indigenous territories.”<sup>14</sup> Whether by means of historical examples of extraction and displacement or newer forms of satellite imagery that facilitate high-resolution resource mapping, the vertical and the extractive are often spoken of interchangeably, and both are opposed to what Gómez-

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<sup>10</sup> Scott, *Seeing Like a State*

<sup>11</sup> In order of appearance: Haraway, “Situated Knowledges”; Louise Pratt, *Imperial Eyes*, Gómez-Barris, *The Extractive Zone*.

<sup>12</sup> Demos, *Against the Anthropocene*, 61-64.

<sup>13</sup> Demos, *Against the Anthropocene*, 71

<sup>14</sup> Gómez-Barris, *The Extractive Zone*, p. 6.

Barris calls the ‘submerged perspective’ as more enmeshed in the material encounters of the world.

Although Demos’ analysis is rooted in a discussion of specific artists, and Gómez-Barris’ use of the word vertical sometimes has a metaphorical flavour, their contributions nevertheless help reinforce a binary between the vertical as objectifying, and the horizontal as a partial perspective in which political and environmental ethics inhere. While it is undeniable that the aerial view has facilitated the very worst forms of extraction and colonial violence, as Helen Houser points out, “the view from above is not proprietary to any one epistemological stance”.<sup>15</sup> Houser’s problematization of recent discussions of the aerial view works by placing it in specific technological contexts, emphasising processes of technomediation and how these become the subject of artistic and activist reflection.<sup>16</sup> What follows draws inspiration from this approach, but instead of focusing on technology per se, it considers the importance of wider infrastructures of knowledge production and the socio-economic contexts in which they operate. This provides a more holistic consideration of visual cultures of extraction, rather than viewing them exclusively through a binary framework, or emphasising the technical means of image production.

## **Rare Earth**

From the abandoned nineteenth century mining towns of Nevada photographed by O’Sullivan to the flooded pocks and holes that riddle the landscape surrounding Manono in the Democratic Republic of Congo, the places where prospecting leads to economic boom often go bust just as quickly. In contrast to some of the towns that O’ Sullivan photographed in the nineteenth century, the promises of riches in Manono have not yet been exhausted. After a crash in the price of tin in the 1980s put an end to extraction that had continued more-or-less uninterrupted since 1915, Manono is now the site of significant speculative investment around its vast lithium deposits – a raw material whose price has skyrocketed as it assumes the status of a critical raw material for many western nations.<sup>17</sup>

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<sup>15</sup> Houser, *Infowhelm*, 178.

<sup>16</sup> Houser, *Infowhelm*, p. 198

<sup>17</sup> In 2020 lithium was added to the European Union’s list of critical raw materials for the first time. For a compelling example of how artists might engage with the subject of critical raw materials see the project ‘Euro—Vision’ by the art duo FRAUD (Audrey Samson & Francisco Gallardo). Project website available here: <https://euro-vision.net/>

The cycle of boom and bust in extractive economies such as Manono is the subject of a number of images produced by the Congolese photographer Georges Senga, which feature in a recent exhibition by the artist group On-Trade-Off.<sup>18</sup> In three complementary series “Tshanga-Tshanga (300 Maisons)” (fig. 2), “Tshanga-Tshanga (Barsin)” and “Tshanga-Tshanga (Mille Bêches)” (fig. 3), the artist uses the aerial view to document the decaying remnants of the last century’s extractive economy. In the first series, his drone mounted camera trains its sights on the once comfortable housing infrastructure constructed for managerial staff at the company, contrasting this with smaller working-class homes photographed from street level in another series, “Tshanga-Tshanga (Barzin)”, named after the Belgium architect and engineer Henry Barzin (1884-1971) who designed many of the buildings in the once profitable colonial mining outpost.

Figure 2. Georges Senga, *Tshanga-Tshanga (300 Maisons)* (2022).

The word ‘tshanga’ [or changanya] is commonly used in the sense of mixing, or blending in Swahili, but also carries a more complex set of associations, linked to the practice of creating patchwork quilts from scraps of leftover fabric. In “300 Maisons” an overhead view turns the buildings into a patchwork of different rooms. The large concrete and brick villas lie in a state of abandonment. Roofs have fallen prey to time and violence during the civil war in the late 1990s, meaning that room divisions are exposed by the aerial view, reminiscent of the architectural drawings used to sell buildings off-plan. In this way, the photographer’s treatment of the ruins simultaneously signals forwards and backwards in time, layering future promises of development on the remnants of a colonial past. “Tshanga-Tshanga” also refers to an ethos of ethnic mixing, which was paternalistically mobilized by mining companies in the DRC in order to dislocate clan and filial bonds, and, as Senga explains to me in an interview, “to create the best worker”.<sup>19</sup> In contrast to the “300 Maisons”, the working-class

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<sup>18</sup> *Charging Myths* (2022) [exhibition], Z33 House for Contemporary Art, Design & Architecture, Hasselt, Belgium, March 6 – August 21, 2022. Curated by Ils Huygens and On-Trade-Off

<sup>19</sup> Georges Senga, online interview with the author, 8<sup>th</sup> June 2022. See also Larmer, *Living for the City*, 40; Van Nieuwenhuysse, *Tussen buit en baat*.

homes in the *Barzin* series are photographed from a frontal perspective, their uniformity testament to this atomistic approach, which is further emphasised by a grid formatted display.

Figure 3. Georges Senga, *Tshanga-Tshanga (Mille Bêches)* (2022).

The third series, “Tshanga-Tshanga (Mille Bêches)” (2022) (fig. 3), focuses on mineral extraction directly, again using the aerial view to document the efforts of the local population in their autonomous mining activities. Despite being photographed from above, these individuals are well above the “threshold of detectability” that limits the maximum resolution of satellite imagery in the interests of protecting privacy and national security.<sup>20</sup> And yet the aerial perspective ensures they are not recognisable as individuals, only as a few of the thousand shovels [*mille bêches*] used to dig the sand quarry that still provides a modest income to the inhabitants of Manono in their search for cassiterite and tantalum. Much of this activity also takes place around the flooded leftovers of the old mining pits. A small sluice box serves as evidence of the continued quest for valuable minerals even after the withdrawal of the Belgium company Géomines in the 1980s – efforts at salvage accumulation that now seem likely to be replaced by more intensive forms of extraction.<sup>21</sup>

As these examples show the selective use of an aerial drone-mounted camera in Senga’s photographs derive a great deal of meaning from their context, and the vertical perspective helps introduce a temporal complexity that resists the totalising qualities of the extractive view. For the Uruguayan political ecologist Eduardo Gudynas, the kind of subsistence mining carried out in *Mille Bêches* does not even qualify to be called extractivism, a term he reserves for a ‘high-volume and high-intensity modality of natural resource appropriation, where resources are exported in primary commodity form with little or no processing.’<sup>22</sup> The current plans to kickstart lithium extraction in the region operate on an entirely different scale, with the Australian company spearheading the project, AVZ minerals, intending to export as much

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<sup>20</sup> Weizman, *Forensic Architecture*. This legal limit to the resolution of satellite imagery differs slightly from country to country, but typically sits at around 0.5 – 1 metre per pixel, roughly the space taken up by a human body when viewed from above. See also Houser, *Infowhelm*, 207.

<sup>21</sup> On salvage accumulation, see Tsing, *The Mushroom at the End of the World*.

<sup>22</sup> Gudynas, *Extractivisms*, 6.



as 80,000 tons of lithium concentrate per month to battery manufacturers worldwide, although efforts on the part of the DRC government to prohibit the export of unprocessed concentrates may complicate matters in future years.<sup>23</sup> Coupled with the fact that the mine is unlikely to create many jobs in the region, it looks increasingly destined to operate in what Cardoso and Faletto term an ‘enclave economy’, insofar as its links to the global economy will be significantly stronger than those to the national economy of the DRC.<sup>24</sup>

When these photographs were made, Senga was based six hundred kilometers south of Manono in Lubumbashi, a city with its own history as an enclave economy, having been established as a copper-mining settlement by the Belgium colonial regime in 1910. In recent years, he has also been involved in a transnational partnership around lithium. The project, called On-Trade-Off, was initiated by the Congolese art organisation Picha together with the Brussels based artist collective Enough Room for Space. The starting point for On-Trade-Off can be pinpointed to 2018, when rumours about the vast lithium deposits thought to exist in Manono had already begun to circulate. The group has grounded its collective output around a core concern for lithium extraction, connecting this to a wider set of issues including cultures of energy, financial speculation, and neo-colonial power relations. In contrast to the unequal exchange characteristic of enclave economies, the group have consciously pursued forms of collaboration that equitably share knowledge and resources, constituting something of a shadow knowledge infrastructure, albeit one operating at a very different scale to the infrastructures of extraction upon which it nevertheless depends. For example, a growing collection of research materials circulate on an open-source platform that has provided raw materials for some of the artwork produced by the group, and a percentage of the profits from any sales feeds back into a collective fund. International travel is also used as an opportunity to exchange physical objects such as books and materials for art production that might be difficult to source in the artist’s home country.<sup>25</sup> An awareness of the uneven access to digital infrastructures is evident in the group’s carefully designed website. With internet access in the DRC still expensive, the design uses images composed of ASCII characters as default,

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<sup>23</sup> Axinocapital “When is AVZ’s Manono project”. Attempts have been made on several occasions to encourage the processing of copper and cobalt within the DRC through an export ban on concentrates, although these initiatives have often been reversed on unenforced.

<sup>24</sup> Cardoso and Faletto, *Dependency and Development in Latin America*, 114

<sup>25</sup> For example Senga brought 1 kg of sand from Manono to Brussels to contribute to a work by Marjolijn Dijkman in the *Charging Myths* exhibition. Entitled *Cloud to Ground #1* (2021-2022), Dijkman created artificial fulgurites by passing an electric current through the soil.

which require significantly less data than the standard jpeg or png formats. Other design features include a banner stating the amount of CO<sub>2</sub> produced with each visit to the website, and the consistent use of black backgrounds, which require less electricity to display than brighter colours.

In the relatively short life span of the group, On-Trade-Off have used these platforms to make and promote artwork both individually and collectively, give presentations, and to participate in exhibitions and residencies. *Charging Myths* was their largest exhibition at the time it opened, and occupied two floors of the Z33 House for Contemporary Art, Design & Architecture in Hasselt, Belgium, featuring visually diverse contributions yoked together through a shared preoccupation with lithium and electricity.<sup>26</sup> By including a discussion of the exhibition in this article, the aim is not to provide a critical overview or evaluate its successes or failures. Rather, the intention is to demonstrate that, like O’Sullivan before him, Senga’s photographs are bound up in wider infrastructures of knowledge production, of which the exhibition was but one public-facing outcome. The consideration of these infrastructures and their socio-economic context compels viewers to think through the nuances of how prospecting operates, and makes it difficult to label one particular visual form such as the aerial view extractive and another grounded or ‘submerged’ without first giving consideration to the exchanges of knowledge and resources that shape their creation and dissemination in the world.

Figure 4. Femke Herregraven, *A Prelude to When the Dust Unsettles* (2022) (video still).

Femke Herregraven’s “A Prelude to When the Dust Unsettles” (2022) is a work that takes a different approach in its exploration of visual prospecting, blending footage of the site of the proposed lithium mine in Manono, and digital promotional videos produced by mining companies that demonstrate cutting edge technologies of extraction. A dizzying array of data visualisations present a landscape visible from all angles, where solid bedrock is rendered transparent at the click of a button. A garish RGB colour palette assembles cloud point data into ghostly snaking forms that trace the contours of a mine’s shafts and tunnels (fig. 4).

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<sup>26</sup> The exhibition subsequently toured to Framer Unframed in Amsterdam from 23rd February – 4th June 2023.

Accompanying this computer-generated imagery, the camera footage is at times just as disorientating, captured by a variety of drones and robots as they quietly probe subterranean passages devoid of human life.

A written dialogue elegantly threads its way through the film, staging a conversation between the mine as it currently stands, and its digital twin existing as an idealised projection. “They survey me as if I was you”, remarks the digital twin, while the mine is keen to point out differences: “where is the ecosystem?” “how can you be my twin when you reduce me to a single mineral?”. This dialogue loosely maps onto the two different types of footage in the film, becoming more pronounced towards the end as the viewer is led above ground, into a landscape that feels at first like it belongs to a first-person computer role play game, before this is intercut with images of the dusty red soil of Manono itself, complete with evidence of low-tech artisanal mining activity. Accentuating the division is a soundtrack composed by BJ Nilson that uses samples of artisan miners digging with hand tools in Manono gathered by another member of the collective, Gulda El Magambo.

Below ground, it is harder to draw a neat separation between the virtual and the real, as many of the tools used to gather film footage seem to also be scanning the environment to gather enough data to create a digital facsimile. The points of passage between the two types of imagery are explored in another short section, where one of the few humans to feature in the artwork is filmed in an immersive ‘virtual blast wall’ environment, in which physical tools are rigged up to motion capture systems enabling movements to be translated into the virtual environment in real time. The environment is the creation of a South African company Simulated Training Solutions (or STS3D), who have developed the use of virtual reality to equip miners with the skills necessary to carry out dangerous operations underground, such as preparing blast charges.

The footage culled from STS3D’s promotional videos dazzles with its promises of a clean, safe, and ultra-modern mining environment quite unlike the extraction depicted in some of Georges Senga’s photographs. Indeed, this allure is something the promotional source material for Herregraven’s video seems to deliberately cultivate. Much like the slick marketing videos and fly-through animations that help to sell luxury properties to investors, an important aspect of the relationship between visual culture and the extractive industries concerns the production of spectacle. In initiatives that require significant capital investment,

economic performance relies first on dramatic performance, as Anna Tsing has demonstrated in the case of gold mining in Indonesia. And yet as the example of real estate shows, this dynamic is not restricted to the extractive industries narrowly understood; it is ubiquitous in many areas of speculative investment, where “economic performance must be conjured like a spirit” so that enough capital can be generated to get a project moving.<sup>27</sup>

In the case of mineral extraction, the production of spectacle often involves a series of identifiable visual tropes. The proposed mining site is typically shown devoid of all human or animal life, creating an imaginary resource frontier of “wild and empty spaces where *discovering* resources, not stealing them, is possible.”<sup>28</sup> While the source material of Herregraven’s video could not be more different from O’Sullivan’s survey photographs in production method or aesthetic, they nevertheless both show a depopulated landscape, whether through digital or analogue means. As has been noted in relation to the King survey, there was little expertise in the human sciences of archaeology and ethnography among the exploration team, and evidence of indigenous populations were conspicuously absent from the resulting visual and written material.<sup>29</sup> Likewise, with the exception of those demonstrating STS3D’s virtual blast wall, the source material of Herregraven’s video installation emphasises the topographical and geological properties of the proposed mine site, creating a ‘digital twin’ in which life is almost entirely absent.

With their ‘thresholds of detectability’, aerial views are certainly one way to depopulate a landscape, and are often bound up in processes of spectacular accumulation in places like Manono. Aerial views also play a small but significant role in “A Prelude to When the Dust Unsettles”, insofar as the artwork has typically been installed using a ceiling-mounted projector beaming the film onto a contoured surface on the floor of the gallery. Floor projection aside, the diversity of tools and technologies of visualization at work in the video demonstrate that contemporary prospecting can function perfectly well without the kind of overhead view that has historically facilitated various forms of extraction.<sup>30</sup> Both Senga’s

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<sup>27</sup> Tsing, *Friction*, 57.

<sup>28</sup> Tsing, *Friction*, 68.

<sup>29</sup> Davis, “Timothy O’Sullivan: Photographer”, 75. As Davis points out, there were only two images of Native Americans in the entire body of photographs produced by O’Sullivan on these surveys.

<sup>30</sup> As Arboleda has shown, new technologies in the mining industry used today can create “highly accurate representations of the subsurface, making the extraction of low-grade ore bodies profitable for the first time in history”. Very few of these adopt a straightforward vertical perspective, and even the misleadingly named

photographs and Herregraven's video demonstrates the plurality of extractive views at play in mineral prospecting, where the dichotomy is not simply between vertical and horizontal axes of vision, but between landscapes as products of layered histories and multi-species relations, and landscapes as the bearers of future desires focused on a handful of lucrative resources. As complementary perspectives on the same physical location, Senga's photographs show how the aerial view can be the bearer of complex social forces beyond extraction, while Herregraven's video reveals how the visual culture of contemporary prospecting is more heterogeneous than existing scholarship might suggest. Taken together as two outcomes of the collective project On-Trade-Off, they demonstrate how such artist generated knowledge infrastructures have the capacity to both mirror and undermine the production of visual culture that supports extractive endeavours.

## **Green Gold**

The establishing shot of Edith Morales' short film "Aerial Root" (2020) is slow to appear. Thin clouds drift past the lens of the drone mounted camera as it makes a gradual descent to the lush vegetation below. The camera eventually finds itself at ground level among a field of maize and a soundscape of loud birdsong. Viewers whose experience of agriculture is limited to industrial monocrop farming may not immediately recognise the landscape as one of food production, with irregular shaped fields sitting between clusters of large flowering trees and no obvious boundary markers in sight. When the camera trains its sights on the leaves and tassels of several maize plants, it is clear that this is a landscape that is as productive as it is picturesque. As the film's voiceover explains, the land is being cultivated using the 'milpa' farming system, in which a single field is planted with several complementary species — typically a mixture of beans, squash and maize— that have adapted to the region over thousands of years. While the squash provides shade to help with moisture retention, the beans deposit nitrogen into soils that would otherwise struggle to satisfy a typical maize variety's appetite for nutrients. Originating in the artist's native Mexico, the milpa system is now practised across the world in a range of alternative approaches to agriculture, for example as a key component of permaculture design.

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'vertical cartographies' pioneered in the late nineteenth century by the likes of Orra White Hitchcock create cross sections of the sub-surface of the earth viewed from the side. See Arboleda, *Planetary Mine*, 4.

The star of Morales's short film is a particular variety of maize known as olotón that possesses the rare ability to fertilize itself by converting atmospheric nitrogen into ammonia.<sup>31</sup> As the camera brings the viewer into ever closer contact with the plant, the focus becomes a series of short bracing roots that glisten with a strangely gelatinous mucus that carries out this feat with nitrogen-fixing bacteria. A particularly useful crop for poor quality soils, olotón maize has now attracted the attention of large research universities and multinational food giants such as UC Davis and BioN2, a subsidiary of Mars Inc.<sup>32</sup> As the voiceover to the video explains, this has led to an attempt to patent the genetic characteristics of the plant, with a view to cross breed it with other commercial corn varieties, "forcing it to enter the circuits of global distribution."<sup>33</sup>

The film is keen to contrast the extractive endeavours of these companies with the socio-ecological context from which olotón maize has emerged over countless generations. As well as the corn itself, the camera focuses on the communities who cultivate it, with hands tending to the young plants, and their eventual yield displayed by Mixtecan women in front of their houses. The voiceover further reinforces this narrative, putting forward a robust critique of organizations such as UCSC and BioN2, whose patent application it describes as "biopiracy" and "an act of pure colonialism".

Another term sometimes used interchangeably with biopiracy is bioprospecting, which denotes the search for genetic, chemical and biomechanical properties of living things that have commercial potential.<sup>34</sup> As well as contributing to the R&D initiatives of the agricultural sector, bioprospecting has also become a controversial topic in pharmaceutical research, with numerous patent applications attempting to codify indigenous knowledge as the intellectual property of large corporations. One of the key requirements of any patent application is to demonstrate the novelty of the product or process under review, a feature that the anthropologist Cori Hayden attributes to the legacy of the enlightenment notion that property should arise from "the fruits of one's labour."<sup>35</sup> This requirement notwithstanding, there have been a slew of patent applications in recent decades that seek to recodify

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<sup>31</sup> Van Deynze et al, "Nitrogen fixation in a landrace of maize"

<sup>32</sup> Pskowski, "Indigenous Maize"

<sup>33</sup> Edith Morales, "Aerial Root" (2020), 3:59.

<sup>34</sup> Mateo, Nader and Taayo, "Bioprospecting", 471.

<sup>35</sup> Haydn, *When Nature Goes Public*, 24.

indigenous knowledge as corporate property. A list of high-profile examples might include the attempt by California-based entrepreneur Loren Miller to patent a vine used to produce the hallucinogenic drink ayahuasca, or proprietary claims on the cactus *hoodia gordonii* native to south Africa, where it has been used by the San people of the Namib desert as an appetite suppressant for generations.<sup>36</sup> For every high-profile case of bioprospecting there are just as many critics, with NGOs such as the Center for International Environmental Law taking on legal cases, and prominent academics such as Vandana Shiva leading the fight against widespread profiteering from indigenous knowledge.<sup>37</sup>

In an attempt to protect Indigenous groups from the sharper end of bioprospecting, a regulatory framework known as the Nagoya protocol was introduced in 2010.<sup>38</sup> As a result, it is now common for an agreement to be drawn up that ensures that some of the profits stemming from the commercial development of a biological resource to be redistributed to the community in which it is found.<sup>39</sup> In the case of olotón, the community who stand to benefit financially from an agreement with UC Davis and BioN2 is the village of Totonpec, where the maize was supposedly ‘discovered’ by Howard-Yana Shapiro, a chief agricultural officer at Mars, Inc. in the 1980s.<sup>40</sup> The fact that other varieties of indigenous corn have been seen to possess the ability to fix nitrogen elsewhere, including on Morales’ own personal farm, raises questions as to who has the right to sell indigenous knowledge, and when such sales do take place, how the resulting benefits are distributed fairly.<sup>41</sup> What is apparent however is the underlying dynamic that such agreements presuppose, encouraging two complementary acts of speculation: on the one hand, the company who seek out biological raw materials and gamble that the resulting product or products will be worth their R&D expenditure; on the other, communities such as Totonpec who speculate that a fraction of the profits will start to filter back into their communities. In effect, both acts of speculation are underpinned by the international legal framework of intellectual property rights, which, as

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<sup>36</sup> Fecteau, “The Ayahuasca Patent Revocation”; Center for International Environmental Law, “Campaign Update.”

<sup>37</sup> See for example Shiva, *Biopiracy*, and numerous other publications by the same author.

<sup>38</sup> *Nagoya Protocol*. Although adopted in 2010, the protocol only entered into force in 2014.

<sup>39</sup> Hayden *When Nature Goes Public*, 2-3

<sup>40</sup> Filmer, “Study Finds Indigenous Mexican Variety of Corn Captures the Nitrogen It Needs from the Air”.

<sup>41</sup> In some cases benefits have been shared with multiple communities who act as joint holders of traditional knowledge, such as the Khoikhoi and the San people of South Africa, who have agreed a benefit sharing agreement for the commercial use of rooibos. See also Hayden *When Nature Goes Public*, 2-3

Noel Castree argues, “bioprospecting generalizes [...] as global ‘common-sense’.”<sup>42</sup> A convention known as UPOV ’91 serves as a good example of this, and with Mexico’s membership now bundled into a trade deal with the U.S., the intellectual property rights of plant breeders and signatory governments to prosecute farmers who infringe these rights looks set to be bolstered significantly.<sup>43</sup>

Figure 5. Edith Morales, *Aerial Root*, 2020 (video still).

In both her artwork and activist practice with groups such as the Espacio Estatal en Defensa del Maíz Nativo de Oaxaca, who work at the intersection of indigenous rights and environmental justice, Morales participates in what could be seen as an alternative infrastructure. This is one that runs counter to the ‘common sense’ of commodification with an embedded practice that protects the cultural traditions that link plants to places. In “Aerial Root”, maize is framed as an “ancestral technology thousands of years in development”. And yet in both the film and Morales’ wider art practice there is nevertheless an ambivalence to the visual techniques used to account for this socio-natural history. This is especially evident when the camera trains its sights on the olotón maize itself, and the aerial roots that give the film its name. In a manner not dissimilar from the Herregraven’s use of commercial imagery discussed above, the high-definition close ups of the gelatinous membrane (fig. 5) that has earned the plant so much attention seem indistinguishable from the view of the bioprospector, and indeed, scientific publications about the plant contain remarkably similar images.<sup>44</sup> While the latter are accompanied by a breakdown of various chemical compounds measured in microgram measurements, there is a sense in which the visual language of Morales’ film also participates in an gaze that visually isolates plant specimens and breaks them down into discrete biological functions, at the same time that it insists on the centrality of the milpa system and the cloud forests of Oaxaca as the cultural envelope in which such specimens belong.

What could be called the ‘specimen view’ in this visual parsing of plant life serves as another example of an extractive gaze that resists any neat separation between vertical and horizontal orientations. The systematic collection, study and classification of specimens is of course not

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<sup>42</sup> Castree, “Bioprospecting,” 46

<sup>43</sup> For a critical reading of UPOV 91 see Grain, “UPOV 91 and other seed laws”, 7.

<sup>44</sup> Van Deynze et al, “Nitrogen fixation in a landrace of maize”.



restricted to plants, as histories of enlightenment knowledge attest.<sup>45</sup> Indeed, O’Sullivan’s approach to photography has itself been called “a kind of specimen collecting”, insofar as it involved a process of observation and selection not dissimilar from the way the surveys other specimen collections were formed.<sup>46</sup> Although common to many enlightenment sciences, the isolation of individual species and their representation according to a set of conventions is particularly central to the history of botany, and particularly the operations of colonial botany. Here voyages of discovery and scientific exploration often stripped plants of their cultural significance, as Daniela Bleichmar puts it, “cleansing” them of their local, and often spiritual importance.<sup>47</sup> This was done in the interests of uniformity; to create repositories of botanical information that were systematic and unvarying in their organisation, and to facilitate comparison between specimens and easily retrievable information. Collections such as herbariums and xylotheques are exemplary in this respect, their function supported by such visual forms as the botanical illustration. As historians of natural science such as Kapil Raj show, these illustrations are governed by a set of strict conventions that require that “seeds be shown apart, whole and laterally dissected, that flowers be drawn separately, and that roots be depicted with the plant.”<sup>48</sup> Images are not produced with the primary goal of creating visual pleasure, but instead convey critical information that can be operationalized in western knowledge systems, as well as mercantile economies of trade. Then as now, the specimen view is a visual form that facilitates speculation, as contemporary scientific reports on plants such as olotón maize attest. The conventions that govern the production of such images may be different today, but their basic function remains remarkably similar: starting with a plant that is seen as representative of its species, stripping it of its socio-ecological context, and further breaking this down into individual parts that fulfil specific functions.

Figure 6. Edith Morales, *Altitud* (2019).

In another artwork, Morales again trains her sights on the reproductive operations of maize, this time focusing on the grain itself. Her exhibition *Yoo Cua Nuniri / Autosuficiencia* at

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<sup>45</sup> Foucault, *The Order of Things*; Daston and Pak, *Wonders and the Order of Nature 1150-1750*.

<sup>46</sup> Davis, “Timothy O’Sullivan,” 87

<sup>47</sup> Bleichmar, “Books, Bodies, and Fields,” 99

<sup>48</sup> Raj, “Surgeons, Fakirs, Merchants, and Craftspeople,” 261

Parallel Oaxaca in 2019 featured, among other things, a work entitled “Altitud” (2019) in which several thousand corn seeds had been mounted onto large white panels (fig. 6).<sup>49</sup> The collection took the artist four years of painstaking research sourcing varieties from remote regions of Oaxaca. Their arrangement for display, while seemingly random, is linked to the altitude to which the varieties have adapted. As Edith explained to me in an interview, corn tends to grow darker when cultivated 1,500m above sea level, rarely the familiar golden yellow of commercially available corn, but also various shades of red, blue and black.<sup>50</sup> The genetic variation is vast. Not only does an individual variety adapt to variables such as altitude and soil quality, but over time a variety will become its own landrace with a distinct cycle of germination, growth, and reproduction. There were as many as twenty-seven distinct varieties in Morales’ exhibition, each of which has deep cultural links to the communities in which it is found. The work is not simply a scientific demonstration of corn’s adaptability, but a map of Oaxaca and the staple food upon which many of its inhabitants depend.

And yet the significance of maize does not stop at the seed, or even at the plant. It is enfolded within a complex web of socio-ecological practices that have developed with and through its cultivation. On a superficial reading of “Altitud”, the artist would seem to be stripping maize of its cultural context and perpetuating the kind of specimen view that permeates bioprospecting. A plant with immense cultural, historical and ecological significance in Mexico is, at first glance, reduced to a collection of individual specimens, tabulated as data, and represented with the cold indifference of a commercial seed bank. Indeed, it is interesting to note that Morales works as an accountant for her day job, which goes some way to explain the aesthetics of administration present in many of her works.<sup>51</sup> The constellation of coloured kernels, as attractive as they are, gives away very little sense of their significance, how they might grow in a field, or what they taste like in the mouth. When viewed in the context of Morales’ work as a whole however, this detachment from the sensory particulars of the maize begins to feel somewhat parodic, as if a deliberate exaggeration of the strategies of commercial seed companies.

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<sup>49</sup> *Yoo Cua Nuniri / Autosuficiencia* (2019) [exhibition] Parallel Oaxaca, October 26 - December 10, 2019. Curated by Oliver Martínez Kandt. Another artwork that catalogues seeds in a similar fashion is Amar Kanwar’s “272 Varieties of Indigenous, Organic Rice Seeds” (n.d.), for which the artist displays rice varieties from the Indian state of Odisha in handmade containers.

<sup>50</sup> Edith Morales, online interview with the author, 19<sup>th</sup> February 2021.

<sup>51</sup> As Anke Te Hansen has shown, there is an old connection between botany and accountancy with “mercantile and scholarly bookkeeping techniques” evident in colonial botany from the early stages of its development. Te Hansen, “Accounting for the Natural World.”

While its administrative aesthetic might suggest otherwise, the knowledge that informs this work is deeply situated, and belies a long-term engagement with a community in which Morales herself is an active participant. As a Mixteca woman whose entire life has been spent in Oaxaca, the artist told me she measures the success of her work against the opinions of fellow activists and local farmers.<sup>52</sup> This commitment is folded into a biographical story, with Morales' own father working as a farmer before moving to the city—a legacy that the artist continues through an experimental farm called the Centre D'Ecologico Milpa Urbana. This is the base from where she catalogues and cultivates indigenous maize varieties, but also carries out a range of other activities at the intersection of art and environmental justice, for example through work with groups such as the Espacio Estatal en Defensa del Maíz Nativo de Oaxaca. At the time I interviewed her, Morales and many others were busy preparing for the Mexico accession to UPOV '91, which they expected to strengthen the hand of commercial plant breeders to claim varieties as their intellectual property. If the visual language of Morales work sometimes echoes the detachment of such administrative and legal instruments, this serves to place these instruments in dialogue with alternative knowledge systems that the artist uses elsewhere in her work. Systems such as milpa existed long before the concept of owning the reproductive properties of a plant, the artist reminds us, and by understanding the extractive view that underpins this property relation, it might be possible to dislodge its claims to being common sense.

## **Conclusion**

As theories of extraction and extractivism are deployed with increasing frequency in the Environmental Arts and Humanities, discussions of its accompanying visual culture have generated valuable analyses of the synoptic, rationalist, and reductive qualities of the aerial view. A study of 'visual prospecting' extends these discussions, both by shifting the emphasis to visual engagement with future resource extraction, and by pluralizing the modes of visual culture prospecting can be seen to employ. While the three main examples discussed in this article are drawn from recent artistic practices, their differing inflections on the extractive view are already discernible in photographs produced over 150 years ago. The role of

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<sup>52</sup> Morales, online interview.

O’Sullivan’s work in helping to frame the West as a territory of untapped potential is an early example of the kind of conjuring act that is needed to attract speculative investment, as can be seen in the contemporary visual culture surrounding lithium extraction. Likewise, the ‘specimen view’ discussed in the last section that isolates items of economic interest and strips them of their socio-ecological relations is also evident in the selection and presentation of O’Sullivan’s survey photographs. Still more entanglements of extraction and visual culture exist in fields as diverse as deep-sea mining and space exploration, and it is a pressing task to understand the subtleties of how these come to structure forms of environmental exploitation that are still emerging.<sup>53</sup>

While O’Sullivan’s survey photographs compress many of the qualities of extractive vision discussed in this article, it is important to stress that they also differ in one crucial respect: O’Sullivan contributed to a visual culture *of* prospecting, while the other artists produce visual materials *about* prospecting. In other words, while the subject matter and visual strategies of the contemporary examples vary significantly, they represent artistic mediations on existing visual cultures of extraction, rather than images that can be operationalised to further prospecting’s aims. By documenting the layered colonial histories of mining in the DRC, or scrutinising the bioprospecting activities of large food corporations, the artworks discussed encourage reflection on the future of resource extraction, and how visual culture plays an active role within its infrastructures of knowledge production.

Whether vertical, horizontal or neither, visual prospecting is not a passive activity that gazes upon an existing world of resources awaiting exploitation. The ‘extractive view’ tied up in the search for biological and mineral riches is made up of a heterogeneous mix of tools and techniques that actively reconfigure the visual field. Artistic visual culture *about* prospecting is no less active, but instead of facilitating extraction, it often serves to mirror and subvert its visual language. In this way the ever-shifting frontiers of extraction are spaces in which visual forms become malleable and open to reuse, where viewpoints or perspectives are not beholden to any one epistemological stance, but bound up in processes whereby the threshold of what is knowable, seeable and extractable are still being formed.

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<sup>53</sup> For a discussion of how representations of volume come to matter in surface mining during European colonialization, current plans to mine the deep sea, and asteroid mining in outer space see Collins et al, “Mine the Volume’ – Excess and the Voluminous Ecological Politics of Capitalist Frontiers.”

## Biography

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