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As the drone flies: Configuring a vertical politics of contestation within forest conservation

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Declaration of interest

None

ABSTRACT

This paper explores how the use of new monitoring technologies, including drones, are being incorporated into forest conservation, with emphasis on what is at stake politically for forest-based communities. This is a critical area to consider, as the cheapness and easy availability of drones has fostered their rapid proliferation in conservation practices, for activities as diverse as wild-life counting and fire prevention. Many have raised important political concerns about these technological developments, and their potential to be used for the surveillance and spatial discipline of minority groups. For example, recent scholarship within political ecology, human geography and conflict studies makes clear that the regulatory frameworks of international conservation are being appropriated by states to pursue racialized agendas of social exclusion in former conflict zones – often with the support of international environmental actors. By justifying increased military presence; surveillance technologies; and stop-and-searches, conservation frameworks have facilitated the containment of “risky” populations and the production of new kinds of borders. However, few have yet explored what it will mean to incorporate drones into the production of territorial claims that can protect commons-based livelihoods and resist new forms of spatial enclosure. By examining the introduction of drones in the Maya Biosphere Reserve (MBR) in the Petén region of Guatemala, I reveal how satellite technologies and drones are also being used as part of community-led resistance to dispossession. Here, drones are used as part of everyday conservation practices, as part of a socio-legal process that I describe as the configuration of a vertical politics of contestation. Following the history of technological innovation in the MBR leads me to show how, despite their associations with military containment, such technologies can be used to rework spatial orders imposed by states.

INTRODUCTION

Monitoring people through surveillance technologies, satellite imaging, CCTV and stop-and-searches, has long been associated with the disciplinary apparatus of states (Budd, 2009; Crandall, 2015). However, the idea that the monitoring of wildlife populations or forests in conservation areas might be exploited to police and exclude, is relatively recent. Across the last decade, scholars within political ecology, human geography and conflict studies have demonstrated how international conservation agendas, which present as politically neutral, are being used by states to justify military interventions in conflicted areas; to spatially contain “risky” populations; and to produce new kinds of securitised borders – often with the support of international environmental actors (Ybarra, 2016; Kelly & Ybarra, 2016; Lunstrom, 2014; Duffy, 2014). Here, technologies developed to control poaching or illegal forestry are exploited to frame groups as potential “eco-threats,” and thus justify greater military presence and forms of spatial containment. The regulatory frameworks introduced to establish new National Parks, biosphere reserves and wildlife programmes in (post)-conflict areas in the Global South have been shown to facilitate the agency of the state within these manoeuvres, and to depoliticise contextual struggles over access and rights (Verweijen & Marijnen, 2018; Lunstrom, 2014; Büscher & Ramutsindela 2015).

In this paper I contribute to this scholarship but complicate the place of monitoring technologies within it. Specifically, I reveal how satellite technologies and drones are also being used by forest communities as part of everyday conservation practices to maintain tenure rights and acquire political visibility. Drones are unmanned [*sic*] aerial vehicles (UAVs) or robotic planes, whose technology has evolved rapidly over the past 15 years (Graham, 2004). Popular in the military for enabling “persistent presence” across battlespace, distancing aircrew from aircraft, and reducing psychological stress (Williams, 2011), drones are increasingly used in conservation to monitor poaching, illegal timber extraction, and potential forest fires (Floreano & Wood, 2015). Following a history of monitoring innovation that sees forest communities teaching themselves to use drones to protect their rights to tenure, I demonstrate that forest monitoring technologies

such as drones can be used to *rework* spatial orders imposed by states. This work is important, because the use of former military technologies, such as drones, in conservation has not yet received significant attention from the social sciences (although see Sandbrook 2015; Duffy, 2014; Arts et al., 2015). Drones offer rich technical possibilities for the management of difficult terrain, are cheap to produce, easy to operate, and thus are likely to proliferate rapidly in the years ahead (Ivošević et al., 2015). However, a growing literature in the conservation sciences, which documents *how* use drones in forest and wildlife conservation (eg. Floreano & Wood, 2015; Ivošević et al., 2015; Paneque-Gálvez et al., 2014; Koh & Wich, 2012), has not yet been met by a parallel examination within the social sciences.

Drones have, on the other hand, received significant attention within political geography in relation to new spaces and spatial practices of war (eg. Crandall, 2015; Gregory, 2011; Graham, 2004; Chamayou, 2015). This work proves valuable for thinking through questions of spatial containment and spatial politics within conservation. For example, the specific human-machinic entanglements entailed in drone technologies, and the “vertical” space they traverse, have served as prompts to think wider questions of spatial regulation, visibility, and subjectivity (Garrett & Anderson, 2018; Elden, 2013; Fish et al, 2017; Klauser & Pedrozo, 2015; Andrejevic, 2016). Such thinking also alerts us to approach monitoring technologies cautiously, as drones reconfigure the boundaries between private and public space, and bring new potentials for viewing, mapping, and regulating human (and nonhuman) populations with little accountability. However, I argue that the suspicion such work confers risks obscuring the struggle that is taking place in and through aerial monitoring in conservation spaces. By incorporating approaches expressed in Science and Technology Studies (STS), I approach technology as *techne* or the “how” of doing social governance, and thus of ambiguous political import. This perspective allows me to follow how drone use in forest conservation enables the creation of a vertical politics of contestation, where powerful spatial claims can be questioned and overturned, rather than dismissing it at the outset for its association with the military-capitalist machine.

To develop this argument, I follow the development of monitoring practices in the Maya Biosphere Reserve (MBR) in the Petén region of Guatemala. Here drones have been incorporated into community-managed forestry practices through the creation of a “monitoring network” by community forestry organisations and their allies. This network collects data in the form of photographs – which are stitched together to create mosaic images – video footage, and biomass measurements, which are later used to create maps and graphics that tell stories about forest change. The coordinating organisation for this network was created during the 1990s to mediate community interests to new state institutions for conservation, which largely excluded resident communities from planning processes (Sundberg, 2003). This is an important case-study, as the racialised policing of rural populations in the MBR *has* been enabled through the production of the region as a space of conservation, contributing to the violent repression of indigenous groups (Ybarra, 2017), and the violent displacement of migrant communities in the name of establishing “governability” (Devine, 2014). However, I will show that the introduction of “bottom-up” monitoring practices, including satellite technologies and drones, have been essential in contesting these new spatial orders. While “rogue” populations are surveilled and policed by organs of the state, local communities are using satellite technologies and drones to *look back* and assert territorial rights.

The remainder of the paper is organised as follows. Section 2 draws on recent scholarship to explore how the incorporation of monitoring technologies into conservation practices embody geopolitical agendas. In the third section I unpack the MBR context, tracing the place of new conservation agendas within longer histories of state securitization and dispossession, as well as the emergence of the forest-based community organisations that coordinate participatory monitoring. This gives way to a close analysis of the ways that “doing drone” changes how and where contestation takes place today. I conclude by making clear that what matters politically in the use of drone technologies in conservation spaces is how collectives form in relation to them, to tell different stories and shape new matters of concern.

2 CONSERVATION AS GEOPOLITICS

Figure 1 From below. Drones in the Maya Forest. August 2018

Figure 2 From above. Drones in the Maya Forest. August 2018

2.1 “Securing the Volume” through Monitoring Technologies

From studies of the policing of rhino poaching (Büscher & Ramutsindela, 2015), to the use of ecotourism to develop counterinsurgency campaigns (Devine, 2014; Ojeda, 2012), recent work in the political ecology of conservation reveals the primacy of framing geopolitical contexts to contemporary conservation, and the pervasiveness of state intervention in its everyday operations. This work has led to nuanced understandings of how the making of conservation spaces and rules has been exploited to contain populations identified as “threats” to state governments, and to racialise social exclusion (Verweijen & Marijnen, 2018; Devine, 2014; Ybarra, 2012), while an international audience stands by approvingly. While new models for conservation that travel from site

to site are lauded for their capacity to turn around deforestation rates and conserve threatened species, they also embody a top-down design process that tends to exclude local people from participation and exacerbate local conflict (Sundberg, 2003). Meanwhile, the introduction of new boundaries for protected areas have been used to justify: the displacement of indigenous groups (Ybarra, 2012); the roll-back of social amenities and protection (Le Billon, 2016); and styles of warfare on minorities including intelligence networks, media and maintenance of governmental legitimacy (Brock & Dunlap, 2018). Over time the discourse used to justify these interventions leads to blurring between potential “nature-destroyers” and potential “terrorists” (Lunstrum & Ybarra, 2017), and configures groups as a ‘natural threat to national sovereignty’ (Ybarra, 2012: 197).

Secondly, political ecologists have shown how the importing of financial tools allow for the monetisation of conservation practices, enabling new kinds of accumulation and spatial exclusion (Sullivan, 2013). Such work reveals the commodification and neoliberalisation of the “natures” of conservation through the incorporation of forms of “nature accounting” (such as natural capital, and ecosystems services) (Büscher et al 2012) that obscure the way such conversions always entail “winners” and “losers” (Brockington et al., 2008). Discourses of socio-spatial demarcation, which label bodies as “out of place” combine with these processes to allow for new waves of “green grabbing,” especially via ecotourism (Fairhead et al., 2012; Bulkan, 2014; Ojeda, 2012). Here Harvey’s reinterpretation of Marx, the “accumulation by dispossession,” becomes “accumulation by securitisation” (Massé and Lunstrum, 2016): how capital accumulation, itself tied to capacities for the enclosure of land and resources, is enabled through the designation of populated spaces as “uninhabited,” or of populations as “risky” and in need of containment.

The new “governmentality,” after Foucault, in play in conservation can thus be considered “biopolitical” – that is, subjects are governed through ideas of “life”, including vulnerability to potential harm and the need to anticipate potential threats. In biopolitical rationalities for governing states, definitions of the population are articulated

through political-economic rationalities and security practices, such that boundaries of belonging and exclusion feel natural (Foucault, 2007). The re-production of such practices in Global South contexts is refracted through colonial histories of appropriation, which rely on rendering some subjects as incapable of knowledge or action, and others as rightful stewards (Nightingale, 2003). This tells us that the power to govern natural environments works not only through authorising actors to intervene, but by producing a regime of governability, which *rationalises* the need for emergency securitisation or invasive surveillance. As states face crises of legitimacy resulting from long histories of struggle over access to land and citizenship rights, appeals to biopolitical rationalities provide a grammar, for example, to justify increasing military presence to contain “unruly” elements (Büscher, 2016). Conservation lends itself flexibly to such ends, as its activities traverse the usual boundaries of public and private; state and non-state; and carry the weight of international concern.

This perspective encourages us to recognise that, in conservation landscapes, violence is less often configured through direct demonstrations of force, but instead ‘through promises and practices of security’ (Massé & Lunstrum, 2016:234). That is, the containment of “risky” populations is achieved through the construction of landscapes of fear and performances of legitimacy, and through the definition of environmental problems as causes of common concern. This reflects broader geographical understandings of the spatial production of violence, which remind us that violence in natural environments is not simply “caused by” resource scarcity or population growth but is created over time in relation to broader political-economic processes, which affect access to, and control of resources (Peluso & Watts, 2001). Such processes exacerbate tension between groups, especially when communities are spatially displaced or deprived of livelihoods, but they emerge from wider socio-cultural processes and affective relations with place. Such relationships can also be manipulated to political ends. For example, in Kruger National Park, the circulation of positive identifications with rhinos as part of place-based senses of identity was targeted through the reporting of specific acts of violence by unknown poachers (Büscher, 2016). The sense of rhino killing being

out of control created a sense of “hysteria” that was then corralled to justify muscular interventions by the state’s armed forces.

The incorporation of new kinds of monitoring technologies into environmental governance also lends itself to the reconstruction of terrain to such ends. This is emphasised in studies of transforming warfare, where it is noted that practices like aerial monitoring operate alongside other “vectors of militarisation” to produce a feeling of spatial insecurity, which can banalise and naturalise violence (Gordillo, 2018). The presence of planes, drones and towers also contribute toward an “affective geometry” over time, creating landscapes of nervous feeling that become ‘part of the planet’s atmosphere’ (*ibid.*:54). Such accounts recall Derek Gregory’s (2011) account of struggles to secure not only spaces but “volumes” in new spaces of war¹. This terminology insists that although we have inherited the idea that geopolitics is a “flat discourse” from military and political spatial vocabularies of the modern state (Weizman, 2007), new styles of warfare involve *vertical* divisions as well as horizontal ones (Williams, 2011). This means that the spatial configuration of airspace reflects struggles to assert nationalism and nationalised borders, through the assertion of a “view from above” (Adey, 2010). For Crandall (2015) this effect is particularly pronounced in contemporary warfare, where the “sightless gaze” of unmanned systems (drones) acquires power precisely through their capacity to “see” without being seen or located (see also Chamayou, 2015). For Gregory, the drone operator, in charge of analysing the image-feed of cameras and deciphering the density of information and complex data, is also central to the creation of a cartographic imagination that makes war seem faraway, virtuous and digital.

2.2 Reconfiguring Vertical Geographies

¹See also Braun’s (2000) work on “vertical territory” and Grundy-Warr et al.’s (2015) work on volumes, fluidity and flows.

This analysis of the spatial production of geopolitical relations may lead us to expect a parallel verticalisation of power relations within spaces of conservation. Where new forms of governmentality are constituted through struggles to regulate airspace (Elden, 2013), so the use of monitoring technologies in conservation spaces make it possible to name, represent, and contain populations characterised as unquantifiable threats.

However, engagement with *non-military* uses of observation technologies are also critical to rethink the gaze and power geometries they enable. Thus, the work of Duffy and Anderson (2016) on the use of kites as platforms for aerial photography allows them to conceptualise how a “vertical commons” can be enclosed, but also resisted. Likewise, while the view-from-above implies superiority over racialised or dehumanised groups, longer histories of the use of open-source software by social movements (see in particular Taylor & Pitman, 2013, for use by Latin American movements) and participatory Geographical Information Systems (GIS) have shown that such visualisation practices can also be democratised, leading to the contestation of established articulations of borders and citizenship (Wainwright & Bryan, 2009; Brown & Knopp, 2008).

Interactions between STS and political ecology in recent years within projects of counter-mapping, vernacular cartography and participatory GIS also highlight the politics of knowledge in play within conservation science to reiterate this potential (eg Nightingale, 2002; Feigenbaum, 2015). Rather than being engineered by privileged actors, emerging security-conservation assemblages are to be interpreted as the provisional, contingent improvisations of situated actors, who bear with them partial networks and associations from other settings (Haraway, 2013). In landscapes shaped by uneven access, these assemblages can be exploited for the consolidation of privilege or control, but they can also be set to other, perhaps more emancipatory ends.

It is clear, however, that participatory approaches cannot be reduced to a matter of involving people in mapping, for ‘it is also a matter of activating, handling and manipulating power relations’ (Rye & Kurniawan, 2017:150). This is important, as

although participatory processes may involve those ordinarily excluded from “official” knowledge processes, there are also numerous barriers to the use and implementation of technologies like GIS, including a potential for the siloing of knowledge practices and for “digital exclusion” resulting from uneven access to the internet (Arts et al., 2015:668). However, the new kinds of visualisation configured by UAV systems, which position bodies, seers and landscapes in new relations, likewise reveal potential for subversive use, for example through the capacity of drones to bring ‘underrepresented, incongruous, and inscrutable spaces into a dialogue with an audience’ (Fish et al., 2017:75). Drones are distinct for their capacity to fly through spaces that are not normally accessible, as well as to “mirror” bodies through other bodies (*ibid.*:75-76), and to transform who sees what. For these reasons, the drone’s flight allows it to encounter histories embedded in the environment, and, to enable a kind of documentation that shake up the relations between fact and fiction, ‘bring[ing] together all manner of human, non-human and natural agents into a multitude of continuous liaisons’ (*ibid.*).

Such accounts lean in part on the work of STS pioneer Donna Haraway to think emerging technologies in terms of processes of “cyborgisation,” which means engaging with the ambiguous potential of the new kinds of circuits that connect and entangle humans and nonhumans (Haraway, 2013). The cyborg is an image of the military exploitation of such circuits, in line with fears raised during Cold War geopolitics. On the other hand, Haraway also presents it as a figure that can be animated through technological curiosity and a relational ethos, into the mediation of a vehicle for feminist socialist futures. Thus, feminist interventions in political ecology and critical geopolitics emphasise engaging with — rather than disavowing — emergent technologies, to foster the transformative possibilities inherent within them, and precisely to oppose the military uses they are also set to. Here we are reminded that drone technologies and satellite imaging foster new ways of looking and knowing, presenting new options for transdisciplinary engagements with experts-by-experience (Nightingale, 2003) and for reaching across the

communication gaps between environmental social science, data systems, biology and vernacular knowledge (Tsing, 2011). Taking place at the interface between ground and air and between state agendas and collective attempts to endure, technologies of aerial monitoring may present new possibilities for what Tsing calls “friction”: the potential to rework the smooth surfaces of transnational capital through different kinds of relationship, or ways of seeing. Emphasising the unevenness of the ways that different forms of embodied knowledge goes on to “count” in official representation, Tsing explains that friction works by creating alternative alliances between people and nonhumans, to contest spatial orders that corral and exclude.

UAVs offer fresh potential to this work, through the way they enmesh us in what Adey (2010) calls “vertical reciprocity”: a reminder of the relational connectivity between earth and air embedded in all forms of human knowledge and navigation. Indeed, Anna Feigenbaum (2015) takes Haraway’s cyborg feminism as a prompt to explore what a “drone feminism” might look like in such terms. For her, this involves infusing the affects and *techne* associated with war-machines with a relational ethos, cultivating intersectional encounters, and taking care across difference. In contrast to scholarship on drone warfare, this approach emphasises the ambivalence of drone technologies as they pervade everyday life. Drones derive from military contexts and can be used for covert monitoring, fear-mongering, and violence from a distance — but they also enable new ways of sensing, connecting, and problem-solving. As such, they contain rich possibilities for engaging us with the *matter* of contested places in fresh ways (Garrett & Anderson, 2018). However, politicising drones within more-than-human infrastructures will mean more than learning to encounter them differently; this difference will need to be channelled into modes of perception and articulation, such that the object becomes a “matter of concern” in STS terms, or even a “matter of care” (de la Bellacasa, 2011). This allows for the possibility of subversion: Garrett and Anderson (2018) list animal rights activism; citizens’ patrols of police; the Dakota Access Pipeline protests to capture

human rights abuses; and the interruption of border force search operations as examples of the appropriation of drone technologies to constitute authoritative counter-stories.

3 VIOLENCE IN CONSERVATION ENVIRONMENTS: A SOCIAL HISTORY OF THE MAYA FOREST

Figure 3: Location of the Maya Biosphere Reserve in Guatemala. Courtesy of Rainforest Alliance.

This section gives context to the use of drone technologies in the Maya Biosphere Reserve (MBR) in the form of a brief social history, to develop the questions raised in the previous section. The material that informs this and the following section has been derived from ethnographic fieldwork undertaken as part of an interdisciplinary project on

community forestry in Mesoamerica between 2015 and 2018. Within the socio-cultural component of this project we worked in four active forest concessions in the MBR (see Table 1, and Figures 3 and 4 for maps) as well as with the forest organisation ACOFOP [*Asociación de Comunidades Forestales de Petén*] and other local and regional actors, to reflect on 25 years of community forestry in the Petén. Interventions included two rounds of focus groups, leading to the co-creation of future-oriented transformation pathways, 44 informal interviews with members of the four communities, 32 formal interviews with members of local, regional and national institutions, ten oral histories with “elders” in the communities, and five interviews during short transect walks. Results of the broader project are partially captured in [author a \(forthcoming\)](#) and led to the production of twelve policy briefings that were delivered to participant community, policy, and governmental organisations through a series of post-project encounters.

Figure 4: Map of forest concessions in the MBR. Courtesy of Rainforest Alliance

Community	Demographics	Concession authorised	Approx number of families
Carmelita	Non-timber communities present since 1920s; relatively homogenous	1997	88
Uaxactún	Non-timber communities present since 1920s; relatively homogenous	2000	225
Laborantes del Bosque	Non-resident community based primarily around Menchor de Mencos, including high number of Belizean immigrants	2000	96
Cruce a la Colorada	More recently established community with higher number of migrants	2001	65

Table 1: Key sites for data collection in the MBR

3.1 State-Sanctioned Violence in the Making of Conservation Spaces

ACOFOP, which plays a central role in the everyday management of the community-managed forestry concessions in the MBR, is a second-tier organisation created by forest residents in the early 1990s. The syndicate that created this formal organisation coalesced while the new Biosphere Reserve, based on a model increasingly popular in international conservation, was being “carved up” by state and international actors, with little local involvement. Baseline surveys conducted in 1990-91 suggested that most residents did not even know the MBR existed, even though by then it encompassed half the department

(USAID, 1995, in Ybarra, 2017:30). The interventions of new international organisations tended to be biased toward pre-existing species protection plans or development priorities (Sundberg, 2003), and, as I shall explain, the state pursued its own interests in the new scheme. Thus, the governmental body set up in 1989 to regulate the new reserve, the National Protected Areas Council (CONAP), was initially comprised of representatives from the commercial forestry sector and a small representation from environmental institutions — but no members of local organisations (Acopa & Boege, 1998). ACOFOP was created to protest this situation and to ensure that the new regulatory could work for the communities. This also meant ensuring that communities could understand what was required of them to procure concessionary rights to extract timber products alongside existing non-timber products (including *xate*, an ornamental leaf, *pimiento*, or allspice berries, and *ramón*, a seed used in baking).

Since the early 1990s, and partly through ACOFOP's advocacy, more than 0.5 million hectares of broadleaved forests have been granted as “community concessions” in the MBR, including twelve community concessions, four municipal *ejidos*, and two forest industries. Concessionary rights thus conform to international regulations for polycyclic timber cutting, fire prevention, and regrowth, and each must be certified within three years. However, they also are managed independently by cooperatives, who elect their own leadership and create management plans. ACOFOP has consistently worked since this time to support the forest cooperatives from an ethos of “accompaniment,” derived partly by visiting parallel community forestry schemes in Mexico, and partly from the previous participation of its members in rural training schools and leadership forums (see author a, forthcoming). This structures its commitments to fostering autonomy and decision-making capacity at every level, as well as legal frameworks and funding mechanisms to direct international funding directly to community institutions. It is essential to the approach that communities are accompanied at every stage of the process to meet regulative requirements; that external threats to tenure are dealt with collectively; and that the communities themselves inform the future strategy of the organisation.

To understand the conditions that enabled this vibrant platform, it is also important to

understand the place of the state, and state-sanctioned violence in the creation of the MBR – in many ways the prompt to seek new forms of organising and monitoring. These conditions depend heavily on the larger political openings created by the counterinsurgency war in Guatemala (1960-96) and subsequent 1996 Peace Accords, which attracted significant international interest to the state's post-conflict future. Attention partly followed the revelation of the scale of the violence of this war in its aftermath: the state's counterinsurgency campaign against Leftist rebel groups, and their indigenous Maya and Ladino *campesino* supporters, had been long, brutal, and bloody. By 1996 it was estimated that between 140,000 and 200,000 people had been killed or disappeared, while hundreds of thousands more were displaced. Maya communities were by far the highest number of victims — more than 80% of those killed during the war were indigenous Maya people – while the majority of those killed in human rights abuses (including more than 400 massacres) were victims of officially sanctioned terror by government forces (Gonzalez, 2002). Oglesby and Ross (2009) explain that this was made possible by building and expanding a concept of the “internal enemy” to the entire countryside, with the result that areas inhabited 90% by Mayan communities came to be seen as “subversive.”

At the time of the creation of the MBR, a new administration, led by president Vinicio Cerezo Arévalo (from 1985), was seeking to redefine conditions of governability by reintroducing the rule of law. The war had not ended, and a brutal counter-insurgency campaign in the early 1980s had recently destroyed more than 600 villages (*ibid.*). However, Arévalo sought to embody an approach that would extricate the government from its heavy-handed reputation and bloody past. This meant collaborating with international peace commissions, but it also meant transferring new energies into large-scale infrastructure projects that would attract international investment and reestablish conditions of governability. Arévalo had thus planned to invest in a large tourist road, *La Ruta Maya*, to be built with financing from the German government, which would create new possibilities for tourism in the country. However, international attention now turned quickly focused on the environmental impacts of the proposed project, with a seminal

issue of the *National Geographic* (vol.176, no.4, October 1989) circulating images of fires in a shrinking Maya Forest, and threatened cultural treasures (see figure 5). Arévalo responded by converting the road into a plan for large-scale forest conservation and settled on “parks” as his geopolitical legacy (Ybarra, 2017).

In a tragic cycle of destruction, farmers slash and burn the rain forest for field crops and pastureland. The blazing Honduran rain forest above will yield only three years of corn before a two-thirds drop in productivity drives farmers to destroy a new patch of forest. Such fires, burning out of control, leveled 2.5 million acres of rain forest in Mexico's Quintana Roo state this year. In a recently burned field in Chiapas state (left), Maya farmers sow corn as they have for centuries, using a pointed stick to pierce the ground. A Guatemalan hillside (right) shows the ravages of erosion on the denuded land.

Figure 5: Images from National Geographic (October 1989)

Until this time, the Petén had been largely considered a rural backwater by the state, functioning spatially to resolve economic and population tensions arising elsewhere. From 1959, state-sponsored colonisation policies had used the Petén as a “safety valve” for social conflicts generated by demands for land in Guatemala’s interior provinces (Cronkleton et al 2008:5), primarily through the *Empresa de Fomento y Desarrollo del Petén* (FYDEP), set up to “colonise” and develop the Petén. Although FYDEP was dismantled in 1978, oral histories tell of encounters filled with tension, and a new wave of *agarradas* [land-seizing] established *de facto* by squatters in its aftermath. More than 40,000 Guatemalan refugees, forced into exile in Mexico, had also been given the option to settle in the Petén during the 1980s, resulting in a confusion over land tenure and high internal conflict. Leading up to the MBR’s creation, the Petén was increasingly characterised by tenure insecurity and violence, from which the state government was perceived to be disconnected.

The Petén’s role in national and geopolitical interests changed quickly from 1989, as the area was declared a “biodiversity hotspot,” the government scrambled to take its cue, and a host of new international organisations entered the area. In Guatemala, as other Latin American countries at the time, structural adjustment and economic crisis meant that the state was not positioned to provide the environmental services it had committed to, so Arévalo’s new forest conservation institution, CONAP, turned to international community for financial and administrative support. A new contract with USAID opened the door to many conservation-focused organisations, including Conservation International (CI), The Nature Conservancy, and CARE International, with economic development institutions quick to follow, including The World Bank, German KfW, British DFID and the US-based Ford Foundation. This “jigsaw” of interventions brought new funding into the region but also introduced competition for access to resources, and rarely resulted in joined-up assistance.

People demonstrated their disapproval with the exclusionary process of the design process and the potential loss of economic livelihoods by burning several CONAP checkpoints in 1991 and 1993 and a biological station in 1997 (Sundberg, 2003). In 1997 a group of officials were also kidnapped on their way to meet with and negotiate the removal of a peasant community from the reserve (*ibid.*). Such episodes were used to justify increased military presence in everyday life in the reserve, and several of the destroyed stations were repurposed to form army bases that would coordinate and surveil the region, ostensibly to prevent illegal logging activities. Devine (2014) emphasises that the new regulatory frameworks imported for conservation were used to green-wash such inventions, as well as manoeuvres even a decade later: for example, when the forestry concession Limón failed to meet its conditions in 2010, it was not only revoked but destroyed violently, and then repurposed as a military outpost. Illegal land sales were the alleged reason for the termination of the contract, and there is some evidence to support such claims. However, the heavy-handed obliteration of the village demonstrated the continuing legitimisation of violence by the state to support the recovery of conditions of governability. The speech given by President Colón, as he arrived at the site by helicopter, names the act as an emblematic effort in the name of the Four Jaguar tourism project (*ibid.*:984), emphasising the importance of such interventions to protect the biological and cultural heritage of the Maya Forest.

The advantage of this “neutral” language to the state was that it brought the support of the new international community of environmental institutions into the enforcement of exclusions that continued to be racially inflected. In the neighbouring department of Alta Verapaz, where many of the violent atrocities of the 1980s were committed, such discourses supported the continuing victimisation of the Q'eqchi Maya in particular (Ybarra, 2017). The Q'eqchi, whose land was given away to European colonists, had long been framed as “less indigenous”, because they lived on lowland plantations owned by colonists, as opposed to the K'iche and Kaqchikels of Guatemala's highlands, more likely to speak Spanish, who were consistently favoured by military planners. As the contours of the MBR were drawn nearby, Q'eqchi agricultural practices, involving mixed swiddens

with long fallow periods, were framed by international actors like the World Bank as “nomadic squatting” instead of knowledgeable stewardship – and as potential threats to conservation practice (*ibid*:36,40). Meanwhile, in the Petén, where smaller indigenous groups and mixed communities, Ladinos, and recent migrants lived side by side, the key political issue was to achieve land tenure and a means to meaningful economic livelihoods. To protect existing uses and achieve lasting tenure, ACOFOP emphasised the Petén as a site of ancestral belonging, framing resident communities as stewards of the forest who had lived in sustainable ways for decades, if not centuries. They aimed to support communities to achieve the requirements to obtain concessionary agreements in the new MBR; to advocate through CONAP to ensure that regulations were fair and supported regional interests; and to build alliances externally to strengthen both ecological know-how and the organisation’s national leverage. The collective aim was to support a form of community-led forestry that would increase local autonomy, rather than vulnerability to fluctuating governmental will.

3.2 Introducing Drones

ACOFOP’s use of participatory monitoring began in a rudimentary sense in the mid-1990s as part of efforts to keep the rigorous fire-prevention and forestry regulations mandated by CONAP, and to empower communities to make their own management decisions. However, GIS and drone technologies were incorporated into these strategies after 2001, when the state’s geopolitical interests in the MBR shifted — in line with the neoliberalisation of conservation natures elsewhere (see Büscher et al, 2012). At this point, the importance of the Mayan archaeological treasures to eco-tourism economies was raised, leading to proposals in the change of tenure structure within the MBR, and proposals for a new “park” infrastructure. Mirroring neo-colonial logics of *terra nullius*, where land is designated empty or unruly to legitimise enclosure and dispossession, proponents of these changes argued that community management had failed to conserve the forests effectively and was not advantageous as a national economic strategy. In response, monitoring became increasingly focused on the empirical production of evidence that the communities were not only *able* to manage the forests effectively, but

had been managing the forest effectively. For example, it was important to show, through graphics and maps, that areas under community management had much lower incidence of forest fires, and that CITES-protected mahogany species were replenishing across the 25-year cycle of rotational cutting.

The most significant threat in this period to the community forestry concessions was presented in 2001 by a well-known archaeologist and his organisation FARES (the Foundation for Anthropological Research and Environmental Studies), for a new conservation park. The “Mirador Cuenca” park was to centre around the Mayan Mirador ruins, located near Carmelita, a residential concession (see figure 4, table 1), to include protected conservation zones, eco-tourism infrastructure, new hotels and a train-line. In a recapitulation of the *Ruta Maya* process, the government — now led by President Portillo — was persuaded of the economic and green portfolio presented by FARES, and a special governmental agreement (129-2002) was signed to create the Special Archaeological Zone of the Mirador Cuenca (Gómez & Méndez, 2005). At the same time, ACOFOP coordinated to resist these plans, on the basis that considerable damage that would be done to the forests by the proposed infrastructures, and that active concessions in La Gloria, Uaxactún and Carmelita would be revoked if Hansen’s plans were implemented. Because of the anchoring of international concerns in species preservation, especially via the CITES-regulation of mahogany, ACOFOP’s documentation of the ecological risks (versus the risks to community livelihoods) proved most effective, and in May 2005, decree 129-2002 was revoked. From 2002 until 2005, ACOFOP worked on a fresh campaigning strategy focused on scaffolding research skills into their forestry training packages; exploring the capacity of GIS technologies to document and improve practice; and developing strategies for communicating evidence to a wide range of potential allies.

Efforts to assert territorial rights based in historical care of the forest remained a central priority for ACOFOP and its allies beyond the mid-2000s, as FARES and its allies accused the communities of corruption, inefficient management, involvement with drug-trafficking and putting a price on his head (Cuffe, 2016). Other threats included a planned

hydroelectric plant (Usumacinta, a US-backed initiative), African oil palm speculation, and drug-trafficking and its associated policing in the region. Meanwhile, support for ACOFOP's counter-campaign was established based on what community forestry could achieve in terms of forestry *and* the preservation of cultural goods. It also meant drawing together an alliance of national and international organisations that could confirm this acts as being of environmental and cultural significance (Gómez & Mendez, 2005).

The introduction of drones into these strategies took place through the development of two new networks, from 2014 onward, as part a new phase of advocacy based in a consolidation of the idea of participatory monitoring. ACOFOP sought to collaborate with local universities and international networks to explore the potential of emerging digital technologies for improved efficiency in monitoring, and for political reasons. The first action network focused on monitoring, with an emphasis on using state-of-the art techniques for evaluating forestry, while the second focused on communication, emphasising engagement with media, social history, and international publics. Each network involved young people from every community concessions in the MBR. The aim was to include 50% men and 50% women of primarily 18-30 year olds, but communities associated the activities with 'visiting dangerous areas with machetes alone' and only two of the 16 members of the current monitoring network are women (Interview with Allan Asturias, ACOFOP, 18-August-2018). This is an area ACOFOP aim to work on, as it also reflects engrained gender roles around forestry² that influence participation in meetings. However, the monitoring network was designed specifically to engage younger people with the future of the concessions while allowing them to acquire skills such as word processing, photography, seed-counting and propagation, the use of GPS monitoring devices and drones – skills that were not usually gained by remaining in their rural communities. It was hoped that the younger generation might imagine a future in the forest, as well as bringing fresh perspective to management practices and cultures.

² Timber management and xate cutting are generally seen as masculine activities, whereas xate sorting or the processing of the ramón seed in new bakeries are women's activities. Currently, the proportion of leadership roles held by women is around 40%, which is an 80% improvement on the previous decade.

The idea of using drones reached the MBR via an exchange with groups in Mexico in 2015, and subsequent attendance of workshops in 2016-17 with the Alianza Mesoamericana in Panama, which focused on the practicalities of making and using drones cheaply. Through these workshops and exchanges with engineers in local universities, as well as with ACOFOP associates trained in GIS, the plan for the use of drones within the monitoring network was elaborated. Drones have been used in ACOFOP since 2015, and by the monitoring network since 2017, with a series of 20 workshops on drone usage taking place throughout 2018, focusing on issues of management and ethics; advocacy; and practice; GIS systems and map-making; and close studies of forest flora and fauna. Today ACOFOP has bought equipment including 11 drones, which can be rented out; digital cameras; laptops; and binoculars for the 16 participants. They have continued collaborating with the Rainforest Foundation in Panama to share experiences: in Panama groups using them are from predominantly indigenous communities, allowing for additional cultural exchange. ACOFOP are also currently working on a protocol for ethical use – there are already regulations in the reserve which require registration, but they aim to design internal policies that consider potential impacts on other inhabitants and data management. Currently, the raw data produced, in the form of photographs, video footage, digital elevation data and biomass measurements, are not open-source, but the maps and graphics produced by the network are made publicly available.

The process of learning to use first GIS, and later drones, has been critical to new articulations of territory, largely because of the motivation to protect concessionary rights. However, it has also been a project of social history-making. Despite the demographic diversity and changing populations of the MBR, this meant presenting community forestry as a continuation of ancestral inhabitation, with links to Maya precursors as with forest livelihoods since the non-timber encampments of 1920s. As such, the forest is constituted as a “commons” that has been used and sustained “since time immemorial.” In ACOFOP’s own manuals, this idea of territory is also nuanced by associating the human activities of (sustainable) forestry with the diversity of social and

nonhuman actors it interpellates:

Territory is socially constructed: it includes practices of occupation, appropriation and production (every territory has a territorial mark, an emblematic product) and management. Thus in territory we encounter resources (material-immaterial, individual-collective), actors (interests-powers, rights, relations-alliances-conflicts) and institutions (rules, negotiations, agreements). For this reason, to speak of territory is not only to speak of a theme or sector – it necessitates an articulation of all the actors. (Asturias, 2016:6, translation mine).

This elaboration of territory in more-than-human terms emphasises that all interventions generate an impact, and that decision-making needs to be guided by possible reverberations in social, economic and environmental domains. Importantly, it also supports the definition of rightful citizens as those who take good care of the forest³. ACOFOP has consequently evolved to be able to communicate the “thickness” of territory in the MBR, taking care that its digital productions also evidence, in empirical terms, the ways that forest – in terms of the population of mahogany trees, pollen regeneration or of green coverage – has been effectively conserved.

The crucial point to take forward into the analysis of the final section is, therefore, that “monitoring” practices in the MBR have emerged from *contested* environments and efforts to legitimise “vernacular” articulations of territory. These points will be critical for understanding the political implications of using drones in forest conservation.

4 PARTICIPATORY MONITORING AND THE CONFIGURATION OF VERTICAL TERRITORY

³ This is not the same as rendering it productive, but it may have important implications in terms of the claims of other groups like the Q’eqchi in the region.

Figure 6: The moment of possibility. Flores, June 2016.

Linked with histories of participatory mapping and GIS, participatory monitoring practices have emerged across conservation sites in association with a politics of contested spaces. Monitoring in forestry settings consists in the systematic collection and analysis of information to determine whether something is changing (Evans & Guariguata, 2008). *Participatory* monitoring specifically refers to activities that involve local people who do not have professional training, held to be best positioned to evaluate the effectiveness of specific interventions, who can also use the results to improve practice over time (Paneque-Gálvez et al., 2014). Such practices are becoming widespread in community forestry because they allow communities to evaluate needs and achievements themselves. It is also reasoned that involving communities can also deter from illegal activity, leading to improved governance and institutional capacities. On the

other hand, critics worry – as with CF itself – that this loads communities with responsibilities that ought to be held at by states or regional actors (Cronkleton et al., 2008). Where failure occurs, this may direct blame toward groups that may a) be primarily concerned with making a living above the poverty-line b) have no previous history of working together, or c) be subject to other kinds of violence and state exclusion. Such concerns have resonance in Foucault’s ideas of biopolitics, where, anticipating the potential of life and potential risks is part of a logic of government that identifies the individual as the locus of responsibility via self-reflection (Braun, 2007). This raises the question of how participatory monitoring leads communities to legislate themselves (and each other) in new ways, and how far the emergent definitions of territory premise citizenship on a “productive” use of the forest.

In the MBR context, the demand for increased skills in monitoring came strongly from member communities, increasingly concerned for the risk of losing the concessions, as well as with engaging the questions of an ageing leadership (65% of Board members are over 50). Increasingly, young people to move into more urban areas, with better access to internet and a wider range of job options — but they would consider remaining if there were options to develop leadership and digital skills (Focus Group, 16-May-2016). As each network is comprised by a representative from every active concession, it was hoped that they would disseminate skills and information that might otherwise be held in the administrative centre of ACOFOP and enable exchange between communities of different demographic compositions. The rationale for using drones specifically mirrors reflections in the literature: capacity to produce imaging in high spatial *and* temporal resolution; potential for three-dimensional imagery; ease of learning, decentralization of data acquisition and access to inaccessible areas (Paneque-Gálvez et al., 2014; Sandbrook, 2014). On the other hand, drones are very sensitive to atmospheric conditions; can collide; require frequent repairs; and cannot fly for very long. This means that there is quite a long training process to use them. ACOFOP try to get around the potential gaps that may result between trained and untrained members by highlighting ‘how to teach,’ and ensuring that drones are available to be rented out in every

concession (although not by non-concessioned communities).

Monitoring in the MBR is primarily about securing access to the forests on a long-term basis (especially via the renewal of the concessions due in 2020), but it also entails critical engagement with broader questions of participation. In documents publishing the rationale for establishing the network this is made explicit through assertions that monitoring can be a platform for enabling other kinds of action-oriented reflection. While the curriculum is designed to enable young people to understand the regulatory framework of the MBR, it thus also includes mechanisms that allow for technical and social-cultural dimensions of CF to be critically challenged. For example, in a manual used to plan and fund the scheme, it is argued that the monitoring network ‘does not only seek to offer responses to questions of forest management but also to create a culture of questioning’ to support ongoing inquiries and innovations (Asturias, 2016). It will help communities comply with important CF regulations, but also to understand and challenge them. From a political geographical perspective, it is relevant that such processes value practice *as theory*, treating local epistemic practices around causality as the basis for intervention, as opposed to something that needs to be incorporated into models devised elsewhere to be understood. This resonates with the approach to knowledge Paige West (2016) lays out for collaborative research, where inquiry feeds directly into both socio-ecological stewardship *and* capacities to resist extractivism.

Figure 7 Jorge Soza demonstrates sustainable chicle extraction

Resisting the idea that forest futures are premised on new models and investments, the monitoring network is anchored in a revisiting of social and environmental histories that precede the MBR. Thus, Figure 7 depicts a visit to the forest near Uaxactún, where Jorge Soza, former chiclero and now technical manager at ACOFOP, demonstrated the sustainable extraction of chicle (“white gold”) while unpacking the history of the area back to the 1920s. The extraction of chicle is only viable if international markets can be located to buy it, and it does not form part of any community’s current livelihood strategies. However, Jorge’s narrative reminded the young people of expertise that had existed in the forest prior to international conservation ('we know how much to take because the trees show us when it's enough'), and of social networks and cooperative structures that were essential to the formation of new concessionary frameworks. Through guided tours of nearby ruins, the group learned of elaborate Mayan astronomical observation rituals and structures, as well as Uaxactún’s important place on the migration

routes of many birds. Building awareness of these historical and ecological “thicknesses”, before teaching the young people how to monitor the forest led to a sense of vibrancy and purpose to the network’s activities and expanded the sense of territory at stake. Technical observation takes place in the context of considering the role of community forestry within broader social and ecological histories, reminding us of the care and context that Haraway appeals to scholars to bring to their engagement with new machines.

As the politics of territory is not neutral, such maps and associated narratives have one overwhelming purpose: to *convince* inflexible actors that community management is working – in economic, ecological, *and* cultural terms. The production of digital images allows the everyday lives of communities to be translated into dialogue with the rationales of government actors, and to compete with the proposals made by others in powerful positions. As Teresa Chinchilla, ACOFOP’s technical director, notes:

[Community forestry] is a very abstract theme, and sometimes politicians don’t understand it. Convincing a politician that this is much more than free territory, that there are people here who work here... this is really difficult, especially with politicians who aren’t interested in forestry. So we have to be on top of it all the time, convincing them, making counter-proposals... forcing them to understand how to do justice... environmental justice, in Guatemala, is something that otherwise just doesn’t happen. (Interview, 18-June-2016)

Environmental justice [*justicia ambiental*], mentioned here, is a key way that monitoring is framed in relation to territory, and was also used by 82% of all interviewees from ACOFOP, CONAP and non-governmental organisations (NGOs) in the Petén to describe ACOFOP’s role. The term is mobilised quite differently here than in the US-based movements from the 1960s onward, which emphasised harms caused by toxic substances close to ethnic minority and poor communities. Here environmental justice is used for the rights of communities to continue benefiting from the forest that they have cared for, with some placing more emphasis on restorative justice, while others focus on securing the right to tenure; and still others on equitable economic returns. Thus, Ervin Flores, an extensionist who works both for CONAP and ACOFOP, explains that for him environmental justice is:

rewarding [*retribuir a*] people who have worked to conserve natural resources. It’s not only a legalistic thing, but rendering known the efforts of communities.

Rewarding means valuing their presence. This is what the FSC and the organisations that visit us say, and what the satellite images show us: Petén is still forested! Additionally, Petén has made its population something more inclusive [*incluyente*] than other regions of Guatemala.

(Interview, 16-May-2015).

The coordinator of the network, Allan Asturias, emphasises the three areas they aim to document in this regard: firstly, how CF has reduced the risk of forest fires; secondly, how sustainable management protects biodiversity; and thirdly, how archaeological sites are being cared for as national heritage (Interview, 14-June-2016). This is important because Mayan pyramids in the concessionary areas are currently being identified in governmental surveys as “at-risk” and “new discoveries” although they have been protected for decades. By documenting this care more effectively Asturias believes that they can disentangle confusion exacerbated by sensationalist journalistic reporting and reveal the various forms of expertise that enable community forestry.

Drone practices thus go beyond the specificities of ensuring (or policing) forestry, anchoring monitoring practices in territorial claims that articulate historical care for the forest. The monitoring network attempts to protect meaningful forest livelihoods, but also to extend political rights to remain in the forest by communicating visually what the forest looks like when CF is in place. This supplements and contradicts spatial imaginaries that portray the Maya Forest as empty space to be rendered productive, or as unruly space to be tamed. To achieve this, images such as Figure 8 are produced. This map uses GIS data to demonstrate how fire risk has been reduced in areas of the forest under community management. The red dots show the incidence of forest fires between the 1st of January and the 27th of May 2017. It is a stark image of the widespread practice of slash-and-burn agriculture as well as the liability of forest fires to spread when the required prevention procedures (such as using coloured flags in the communities to indicate when burning is allowed; the deployment of patrols; the construction of ditches and gaps between forest areas) are not in place. The pale green areas are the failed concessions; fires have been prevalent in several of these. There are some incidences in the active concessions, but its markedly clearer of red dots. The spatial representation becomes evidence, which asserts that ‘we are managing the forest well.’ By expanding

information collection to the use of drones and moving visual representations, ACOFOP are working out how to make other actors interested in what they are doing: to produce a feeling that the future of the concessions matter to other people's concerns. Both satellite photography and drone technologies make it possible to produce cartographic *testimony* – eyewitness or empirical accounts that evidence claims to presence and activity. This, they hope, will make their territorial claims harder to overturn.

Figure 8 Fires detected in the MBR 2017. Image source: ACOFOP (2017), used with permission

The incorporation of social history and an ethos of care into monitoring also chimes with the politics of Tsing's accounts of more-than-human attunement. In her accounts of Indonesian forestry, Tsing emphasises the importance of attending to collaborations between people and forests, to demonstrate that the "empty space" development organisations sometimes imagine never really exists, for 'the forest is full of the markings

of past communities, and these are also potential communities' (2011:198). Echoing ACOFOP's definition of territory, this point was also articulated in another way by Roan Balas from the Wildlife Conservation Society, who suggests that:

many people make the error of underestimating [the communities]. Some people look on them as a *tabula rasa*. But there is great leadership capacity in the concessions. There are also many different agendas among the communities that cause a lot of problems. It's important to take both things very seriously. (Interview, 3-May-2016).

This emphasis on both conflict and capacity for care echoes a point throughout ACOFOP's documentation: that development interventions need to understand and engage the contexts they insert themselves into and support existing capacities, rather than imagining their own projects as the potential solution. Otherwise existing geographies of violence may be reproduced, or transformed into new kinds of exclusionary control.

On the other hand, it is interesting that, in attempting to assert an "invisible" social presence, such practices also transform the process of seeing, self-reflection, and technical doing of forest communities. The nonhuman species of the forest are also encountered freshly through drone eyes, with many describing the curious vertigo of witnessing the forest from above the canopy, and the incredible depth with which the different layers of human and nonhuman life can be witnessed. Finally, participants report being moved by perceiving from above the large-scale damage of deforestation. 'It makes me feel something like sadness,' noticed one younger participant, 'although I feel disjointed from myself when I am flying [the drone], I feel more connected with the individual trees by seeing what happens when there is no care. It makes me want to act.' The affective experience of using drones may expand a capacity for care in unexpected ways: we associate conservation with political neutrality and the "pure" sensations of being moved by encounters with nonhuman life, but participants also report a renewed sense of connection with species life through their experiences of 'putting on the goggles.' In the MBR, monitoring with drones is part of constituting robust claims to territory that can politicise conservation and the agendas it serves. However, experiencing the entanglement of human and nonhuman life through vertical technologies is also

changing this expertise-by-experience in new and important ways, folding in new perspectives and depths; enabling fresh forms of communication; and drawing senses of being part of the forest landscape into political dialogue. It may be that such technological entanglements offer important tools for *resisting* the militarised, securitised, and neoliberalised visions of conservation that are acquiring traction around the world.

SPECULATIVE CONCLUSIONS

Figure 9 Putting on the goggles

In this paper I have explored the place that participatory monitoring practices hold in relation to processes of state-sanctioned violence within forest conservation. Against a backdrop of long-term and systematic exclusion of indigenous people and subsistence forest communities, I have suggested that participatory monitoring with drones in the MBR constructs a stage on which forest inhabitants can appear as rights-bearers and experts. Situated by a longer history where conservation has been used to articulate agendas of counter-insurgency and racial exclusion by the state, the geopolitics of this practice inheres precisely in the friction that can be exerted on spatial claims that work by promising protection from external threats, as opposed to tenure security. The use of drones enables alternative claims to territory to be assembled on the basis that the forest is already being managed effectively.

It is difficult to draw concrete conclusions in this domain, for the drone is a device with immense potential to harm, to survey, and instrumentalise war – not least because its operator is conveniently distant from any arena of suffering. On the other hand, the potential for new depths of perception and the navigation of volumetric space offer fresh relational fibres for an ethics of care. Like the invention of the telescope, which, forever changed our perception of the cosmos’ (Von Humboldt, 1997 [1850], in Garrett & Anderson, 2018) drones also ‘reshape our geographical imaginations’ and open up perspective on different possible presents. Through their capacity to view, drones are also used to assemble different configurations of the vertical, and to assert different kinds of world. Perhaps the difference between the appropriation of conservation technologies into policing machines of war, and as media for the assertion of more expansive forms of more-than-human care, inheres in this view on the multiple. Unnamed, excessive presences can be named as “threats” to be contained, but they may also be inspirations for art, dialogue, encounter and new kinds of science. The future of drones in conservation is ambiguous and unsettling, but I have suggested that this is exactly where their political potential inheres.

What matters, politically, is not *whether* drone technologies are used in conservation spaces, but how collectives form in relation to their potential, to tell different stories and shape new matters of concern. Such a politics is never finished; never finally anchored in logics of containment or agendas of liberation. Drones are entangled in war technologies, and green security processes, but they are also mobilised as means to assert territorial claims on the part of excluded actors, and to transform the affective experience of doing conservation. Such performances are themselves always partial, situated and located, which reiterates the importance of continuing conversations over the ends, means, and ethics of specific conservation technologies. Drones occupy a boundary between technological fact (itself constructed) and speculative fiction (at times an experimental site for truth). As such, their use in conservation spaces is neither easily a sign of green security nor of effective resistance. The *how* of the drone is what matters. This is still an open question and this “how”, in the Maya Forest, is the material nature of its politics. Speculations over “posthuman” assemblages of human and technology open up the ambiguity of technologies to be appropriated and to appropriate life and remind us that the question of technological possibility is never finally decided.

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