Undermining our Future by destroying the Past: Extractivism, Resource-driven Wars and the Loss of Traditional Ecological Knowledge in the lower Cauca region

By

Samuel Steinhorst

S1741195

University of Twente, Enschede

July 2019

Supervisors: Dr. Ringo Ossewaarde, Associate Professor in Sociology of Governance, Faculty of Behavioural and Management and Social Sciences

Ernesto Andrade Sastoque, PhD. Student STEPS department

Extract

This study investigates a threat to sustainable public administration in the future. It describes a contemporary epistemicide, i.e. the de-legitimation and destruction of ecological and indigenous knowledges, as a material-semiotic process, rather than a clash of cultures where one culture is 'murdered'. This research asks for the implications of different types of resource extraction and a 'small war' for the re-production of traditional ecological knowledge in a non-sovereign territory. Applying the Actor-Network-Theory, the study follows the ordering of human and non-human actors in networks of ecological knowledge re-production, conceptualized as 'ecological commons', as well as those in extractive and violent networks. These descriptions reveal deep-rooted controversies over the anthropogenic appropriation of nature and natural processes, which surface in violent confrontations that are detrimental to ecological knowledge re-production. Ecological ways of knowing and sustainable resource use by indigenous and subsistence communities are critical to designing solutions to the ecological crisis which confronts administrations world-wide. The loss of these knowledges and practices may contribute to the future escalation of the ecological crisis through the de-legitimation of non-exploitative indigenous resource uses and the simultaneous proliferation of high-risk large-scale extractive practices in ecologically sensitive areas. The analytical approach is coupled with an ethnographic approach to data gathering in the lower Cauca region, a sub-region of the Antioquia department in Colombia. This region is the scene of an armed conflict that is maintained by and for extractive activities such as hydropower, gold mining, land grabbing and cocaine production.

Keywords: Anthropocene; Ecological commons; Indigenous & Subsistence Communities; Extractivism; Resource-driven 'Small War'; Epistemicide; Traditional Ecological Knowledge

Acknowledgements

I would like to express my sincere gratitude to both of my supervisors, Ringo and Ernesto. Ringo supported this undertaking with his intellectual guidance from the start, accompanying it along a long and winding path to its very end. I would like to thank Ernesto for his support and guidance in the field, which prepared us for investigating in a very difficult and new environment. Without this support, which came in the form of tactical advice, contacts and security preparation among others, this research would not have been possible, least of all because it took place in the framework of Ernesto's own research project, an extensive investigation into the possibilities of transformative change in extractive economies.

I would furthermore like to thank the University of Twente in Enschede, the Universidad Externado in Bogotá and the Universidad de Antioquia in Medellin and Caucasia. The University of Twente, by supporting this collaborative international project, ultimately enabled this research to take place. The Universidad Externado, through its Centro de Investigaciones y Proyectos Especiales (CIPE) and the Universidad de Antioquia (UDEA) supported our research by providing facilities and administrative support in Bogotá and Caucasia. I especially thank the staff of the local NGO RioAbajo and the UDEA campus in Caucasia, from the director to the gatekeepers, who provided a peaceful working environment among the hundreds of Iguanas living on campus, in addition to advice and material support, even accompanying me on excursions to far-flung indigenous communities in addition to teaching me how to fish *Cachama* from the campus pond.

My greatest thanks go to my respondents and local contacts in the lower Cauca region and Medellin. They took great lengths of time and effort to meet me and answer my questions, sometimes travelling for eight hours so that I did not have to enter hostile territory. Leaders in local communities, especially school teachers, helped me by facilitating meetings and excursions with local youths. Not once did I feel unsecure in these communities, on the contrary, I was always given a warm and almost overwhelmingly friendly welcome. Members of the communities I visited will leave a lasting impression on me, from the 5-year-old Emberá who showed me around his village to the 13-year-old I met on a tuk-tuk ride who was just returning from the coca fields with his pockets full of cash and his fingers swollen to the size of potatoes. My Colombian neighbors, local acquaintances, and friends also contributed to this research in a variety of ways, by offering insights into their experiences in the civil war, providing a place to string up my hammock or literally tending to my wounds. It is an honor to have met these people, people whose voices are typically not heard. This thesis also seeks to provide a stage for these voices from subaltern Colombia.

Table of Contents

List of Images

1. Introduction

1.1 Background & Knowledge Gap

This study describes how the systematic disregard and eradication of traditional ecological knowledge is an inherent feature of the enclosure of 'ecological commons' through resource extraction and resource conflicts (Korf, 2011; Weston & Bollier, 2013; Esteva, 2014; Gudynas, 2015). It does so in in material-semiotic terms, borrowing analytical tools from the Actor-Network-Theory (Latour, 2005; Law, 2007). Here, this approach serves to highlight the frequently ignored materiality of knowledge and culture, in this case of indigenous and subistence communities in Colombia. Often, the loss of knowledge is described with grand labels such as 'the killing of knowledge', 'cultural genocide', or 'epistemicide' (de Sousa Santos, 2016; Hall & Tandon, 2017). From a material-semiotic perspective, these terms are inadequate, presenting knowledge loss as a devious plot where some violent power structure, be it colonialist, capitalist or neo-liberal, conquers a territory and replaces ancient epistemes with a 'weak mixture of lost tradition and unaffordable modernity' (Latouche, 2004; Nyamnjoh, 2012; Santos, 2016). While they are not inaccurate, these are only superficial descriptions, however. They pay little attention to the actual knowledge holders, their tools and physical environment, which can be considered as 'nodes' in a network where knowledge circulates, both in indigenous or subsistence communities as well as in the corporate networks that enclose their commons (Strathern, 1999; Weston & Bollier, 2013). Terms such as 'cultural genocide' are not focussed on how knowledge loss occurs, instead taking it for granted as a meta-physical by-product of imperial expansion. The reproduction and loss of traditional ecological knowledge (TEK) is not merely a meta-physical but also a material phenomenon (Law, 1992): People in indigenous and subsistence communities establish associations with a variety of organic and an-organic materials and geo-physical cycles employing yet more materials and 'tools' (Strathern, 1999; Cárdenas Grajales, 2010). As the scholar-activist Vandana Shiva (2010: 232) explains: 'Nature herself is the experiment and ordinary people are the scientists […]'. TEK can thus be described in the same terms as scientific knowledge, it is a 'social product rather than something generated through the operation of a privileged scientific method' (Law, 1992: 2). As shall be explained in depth later, the term 'social' here encompasses much more than human agency, including actors such as ideas, materials, natural processes and knowledges (Latour, 2005). Just as technology and science are central to the modernist project of mastering or commodifying nature for economic growth (Mignolo, 2011), ecological knowledge is crucial to the functioning of ecological commons (Weston & Bollier, 2013: 158). It is not possible to understand the contemporary loss of indigenous ecological knowledge without considering, how the project of economic growth is related to the appropriation of materials, knowledges and processes which are crucial components of ecological commons.

Weston & Bollier (2013) distinguish six types of contemporary (ecological) commons, among them indigenous and subsistence commons. Ecological commons then is a term to denote a system of organization which regulates the anthropogenic utilization of 'common-pool resources' and 'eschews individual property rights and state control' (Weston & Bollier, 2013: 125). Communities establish the commons through 'vernacular law', i.e. 'unofficial norms, institutions, and procedures that a peer community devises to manage its resources on its own, and typically democratically' (Weston & Bollier, 2013: 20). Departing from such an economy-centred definition of the commons as a management system for resources, this study emphasizes that the commons 'is not an alternative economy but an alternative to economy' (Esteva, 2014). It is not a system but rather an 'activity', the enactment of heterogeneous social ties or 'relationships' among people, natural materials and processes for the sake of sustenance (Latour, 2005; Linebaugh, 2008; Esteva, 2014). More importantly, ecological commons are not centred around 'resources', these are an invention of modern western societies, which commodify nature as input for industrial production (Shiva, 2010; Conde & Walter, 2015). Defining ecological commons as 'assemblages' of actors – human and non-human, enables the actions and relationships that constitute them to be retraced as 'actor-networks' (Watson-Verran & Turnbull, 1995; Latour, 2005). Accordingly, an epistemicide can be described as the product of material and semiotic disruptions of associations in an actor-network where ecological knowledge circulates. In this study, the focus is on two closely linked phenomena that contribute to epistemicides of TEK: Extractivism and 'small wars' that are fuelled by resource rents (Korf, 2011; Gudynas, 2015).

The exploitation of natural resources in weak (or non-sovereign) states that lack territorial control is typically a key factor in prolonged violent conflicts or 'small wars' fought between unequal adversaries (Malamud, 2018; Korf, 2011; Collier, 2009). A 'small war' is a war with highly unequal adversaries, where 'local livelihood struggles [are linked] with war economies, greed with grievance' (Korf, 2011: 750). Extractivism then refers to the appropriation of immense volumes of materials and natural processes which are transformed into inputs for industrial economies (Gudynas, 2015). Ever since extractive economies were established in Latin America 500 years ago, extractivism has been the dominant mode of capital accumulation from Patagonia to Puerto Rico (Acosta, 2012: 85; Gudynas, 2012; Galeano, 2015). Since then, extractivism has coincided with oppression, authoritarian governments, civil wars and instability in nearly every post-colonial state established there but also in other conquered continents such as Africa (Galeano, 2015; Gudynas, 2015; Burgis, 2016). The installation of an extractivist economy in Latin America and Africa coincided with the rise of mercantile and later industrial capitalism in Europe and North Amercia. This is no coincidence: The metals, raw materials and 'free' labor provided by the colonies were the criticial input needed to develop industries in Europe and markets for their products in colonized territories (Galeano, 2015). Historically, extractivism is to Latin American indigenous peoples what the Holocaust was to European Jews. Scholars estimate, that 8 Million indigenous slaves died in the mines of one silver-bearing mountain

alone, the Cerro Rico of Potosí, Bolivia (Galeano, 2015). By far the most notorious, Potosí was only one of thousands of sites of extraction (Ibid., 2015). Genocides typically coincide with epistemicides (de Sousa Santos, 2016). Galeano (2015) quotes the historian Sergio Bagú regarding the destruction of indigenous knowledge in this deadly extractivist economy: 'It is almost certain, that hundreds of indigenous sculptors, architects, engineers and astronomers were thrown into the Hispanic mines, mixed up with the multitude of slaves, to realize a grueling and exhausting work of extraction.' (Sergio Bagú in Galeano, 2015: 65). These indigenous academics and many more artists, craftsmen, doctors and agriculturalists did not survive the mines to write down their memoirs, their knowledge is lost forever. The process of indigenous knowledge destruction in extractivist territories is far from over, it continues, albeit under different circumstances as we shall see.

Growth-based industrial economies, which were established also through extractivism in Latin America (Galeano, 2015), now consume disproportionately more raw materials than subsistence economies, relying on much longer supply chains, more energy and materials and subsequently generating more waste (Shiva, 2010; UNEP, 2016). Human beings, especially those living in industrial economies, are consuming approximately a third of the bio-physical output of the earth with a growing tendency (Bridge, 2009; UNEP, 2016). We are among the most potent forces shaping the planet, moving as much material with our bulldozers than plate tectonics (Bridge, 2009). This realization has given rise to the term 'Anthropocene', a term that acknowledges the interconnections between all of earths systems at the same time that it acknowledges the role of humans in altering these systems and destroying important components of them, primarily through excessive resource extraction and waste production (Rockström, et al., 2009; Wright, Nyberg, Rickards, & Freund, 2018). The Anthropocene is categorized by a commodity frontier, 'the locus where extraction geographically expands' (Conde & Walter, 2015), a frontier which continuously advances deeper into relatively undisturbed natural areas and indigenous territories (Gudynas, 2015; UNDESA 2019). The knowledges and practices of the people inhabiting these areas precede the modernist dogma of mastering nature (Mignolo, 2011; Escobar, 2016), some even precede the Neolithic revolution. The Anthropocene, an era that will likely be characterized by ecological crisis' more than any other time-span inhabited by modern humans (Klein, 2014), gives rise to questions of deep sustainability transitions in the field of public administration (Mulder, 2007; Daly, 2007). If we are to abandon an economy of infinite material growth, we need governance systems and knowledges that sustain us while efficiently allocating resources without conflicts. When extractivism, resource-driven small wars and the enclosure of ecological commons as well as the ensuing loss of ecological knowledge are treated as distinct political, economic or epistemic concepts, they have relatively little explanatory power to tackle these questions. Applying ANT, this study instead assumes that armed conflicts, the transformation of large swaths of territory for materializing consumption and the loss of ecological knowledges constitute a vicious cycle that fosters

future extractivism, at the same time that it destroys vital tools for organizing responses to the ecological crisis which characterizes the Anthropocene (Wright, Nyberg, Rickards, & Freund, 2018).

1.2 Aim & Research Questions

This study seeks to draw attention to the precariousness of traditional ecological knowledge networks and how knowledge is an essential part of the conflicts over resources (Gellert & Lynch, 2003; Berthoud, 2010; Gudynas, 2015). By drawing also on arguments from ecological economics, it thereby contributes to debunking the myth that sustainable development is sustainable in a deep sense (Daly, 2007): By relying on large-scale violent extraction, the contemporary sustainable development approach threatens the establishment of truly deep sustainability in the future. The relevance of TEK and ecological commons for sustainable Public Administration is captured in the large number of people worldwide who depend on direct access to natural resources: An estimated 2.5 billion people world-wide, among them 370 million indigenous peoples, sustain themselves from commonly accessible nature, from forests, rivers, land, natural species and a variety of geo-physical processes, employing traditional ecological knowledges that have adapted to their respective environments for millennia (Shiva, 2010; Weston & Bollier, 2013; UNDESA, Culture, 2019; Tauli-Corpuz, Alcorn, & Molnar, 2018). It is not desirable nor possible, for various reasons, for this third of humanity to engage in the 'foolish race' of conventional industrial development (Esteva, 2014). At the dawn of the Anthropocene, the accelerated loss of ancient (indigenous) knowledges weighs especially heavily on humanity's chances to thrive: 'To actualize a flourishing ecological governance paradigm […], we must upgrade our mental operating system from Neolithic to Anthropocene and strive for a worldview that accommodates qualitatively different relationships with Nature itself and with each other.' (Weston & Bollier, 2013: 3). This call for a meta-physical u-turn is directed at western growth societies, indigenous and subsistence communities need not be taught how to engage respectfully with nature (Shiva, 2010). Lately, the recognition that we are on a catastrophic trajectory (and have to steer away from the absyss) has transgressed from a peripheral to a mainstream position. This trend is reflected in recent publications, such as the 2019 Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) report on species extinction. These publications increasingly endorse radical solutions to the ecological crisis, such as degrowth, i.e. the downscaling of production and consumption (Latouche, 2004; Díaz, Settele, & Brondízio, 2019). Degrowth and ecological commons are complementary: If industrial networks are degrown, ecological commons can be 'regrown' (Brownhill, Turner, & Kaara, 2012: 96). However, ecological commons are far from constituting a safe haven for projections of sustainable human-nature relations in the Anthropocene: They are still being oppressed and enclosed, often violently (Daly, 2007; Weston & Bollier, 2013; Esteva, 2014). Critical degrowth proponents such as Saed (2012) maintain that 'those arguing for degrowth tend to avoid

dealing with the militarism and imperialism that enables the diversion of resources [for a minority's consumption]' (Saed, 2012: 28). This study zooms in on precisely this diversion and its' consequences for ecological ways of knowing. Even though the enclosure of commons may be reversible from a legal-economic perspective (Brownhill, Turner, & Kaara, 2012), the revival of commoning as such is much more complex, as it depends on the survival of ecological knowledges that have adapted to and with specific conditions in commons for millennia (Weston & Bollier, 2013; Klein, 2014; Tauli-Corpuz, Alcorn, & Molnar, 2018; UNDESA, 2019).

In this sense, the aim of this study is to examine how supposedly 'sustainable' resource extraction and resource-driven violence continue to enclose commons, in this case those of indigenous and subsistence communities in Colombia, thus contributing to the loss of TEK that was applied in these commons. The principle research question formulated is: *How do extractive and violent actor-networks contribute to the 'epistemicide' of TEK by enclosing ecological commons in the lower Cauca region?* The research question is descriptive, phrased in terms of Actor-Network-Theory and burrowing the expression of 'epistemicide', i.e. the destruction of non-western knowledge systems, coined by de Sousa Santos (2016). The first of three sub-questions formulated asks for the reproduction of traditional ecological knowledges: *How are ecological commons in the lower Cauca region ordered around the appropriation of nature with TEK?* This question asks for the associations between indigenous and subsistence communities and natural actors and processes, focusing on the specific role of nature and TEK for ecological commons in the case-region. The second sub-question on the other hand deals with extractivism: *How are distinct extractive actor-networks ordered around the enclosure of common 'nature' and its conversion into resources?* This question asks how the very same nature that indigenous and subsistence communities utilize is converted into resources, extracted and transformed into goods for consumption in distant locations. It also asks for the process of legitimization of extractive practices by the market and the state. The third sub-question investigates the concept of resource driven violence in the case region. It parts from the assumption, that violence, although it also exists independently of extractive activities, is an important tool for a variety of actors to ensure access to exploitable nature: *How are 'small-war' actor networks in the lower Cauca ordered for ensuring the appropriation of nature by various extractive actors?* This question aims specifically at the methods employed to prepare territories for extraction. The thesis progresses in this manner as well, each sub-question corresponds to one section of the data analysis which focusses on the specific actor-network that the study retraces in the data (1. ecological commons, 2. extractive and 3. violent actor-networks). In a fourth section, the insights generated will be condensed into a short discussion of how the violent enclosure of commons for resource extraction de-legitimizes and destroys TEK. The analysis is preceded by the chapters explaining the theories and methods of data analysis and followed by a conclusion chapter.

1.3 Research Approach

The specific academic value of this paper rests on its unusual data set for exploring these contentious issues: An in-depth case-study of the lower Cauca region in north-central Colombia that is characterized by resource extraction and ongoing armed conflict, which continues also after the so-called Colombian peace process. The lower Cauca region is home to indigenous peoples such as the Zenú or Emberá as well as other subsistence communities. The extractive activities that fuel the ongoing 'small war' include cocaine production, legal and illegal gold mining, hydropower exploitation and extensive cattle-ranching (El Espectador, 2019; Fundación Paz y Reconciliación, 2018; Zuleta, 2018). Data was collected during a five-month stay in the case region, drawing from diverse sources: Semi-structured interviews, participant observation, official documents and news coverage. The interviewees are representatives from local and indigenous communities, academics, government officials, and social leaders. The analytical approach draws from the 'Actor-Network Theory' or ANT (Latour, 2005). ANT is not a social theory *per se*, it is an approach to social analysis that is descriptive rather than explanatory. Scholars of ANT seek to overcome the narrow definition of the term 'social' in social sciences (Latour, 2005). Its proponents assume instead that what constitutes the social are 'materially and discursively heterogeneous relations that produce and reshuffle all kinds of actors including objects, subjects, human beings, machines, animals, 'nature', ideas, organisations, inequalities, scale and sizes, and geographical arrangements.' (Law, 2007: 2).

A principle claim of ANT is that the adjective 'social' should be taken by its original meaning. Law and Callon (1997) find that while baboon societies are composed only of baboon bodies, human societies encompass much more than human bodies. Accordingly, sociology has to refocus on the original meaning of 'social' and include the *equipment* of humans in 'social' analysis': 'The Latin socius denotes a companion, an associate. […] The next meaning of social is to have a share in a commercial undertaking. 'Social' as in the social contract is Rousseau's invention. 'Social' as in social problems, the social question, is a nineteenth-century innovation. […] Starting with a definition which is coextensive with all associations, we now have, in common parlance, a usage that is limited to what is left after politics, biology, economics, law, psychology, management, technology, etc., have taken their own parts of the associations.' (Latour, 2005: 6). Latour proposes to expand the meaning of the social again: 'Even though most social scientists would prefer to call 'social' a homogeneous thing, it's perfectly acceptable to designate by the same word a trail of associations between heterogeneous elements.' (Latour, 2005: 4). This study thus seeks to join the ranks of 'actor-network successor projects', which place an emphasis on the multiplicity of realities and networks and distance themselves from the idea of a 'center' or a single network and embrace the notion of the 'performance' of networks (Law, 2007). Like many investigations in Science and Technology Studies, these projects are typically empirical case-studies, in the majority of laboratories or similar settings where scientific knowledge is practiced. In

contrast, this study reassembles the organization of an epistemicide, i.e. the destruction of knowledge (Latour, 2005; de Sousa Santos, 2016), investigating the loss of TEK in its own setting, in rainforests, on river banks, open-pit mines or wooden canoes, pairing ethnographic methods of data collection with this material-semiotic approach to data analysis.

2. Theory Chapter: Three types of actor-networks in the lower Cauca region

The objective of this chapter is to discuss the research questions and the concepts they entail in order to generate theoretical expectations that will be addressed in the analysis. The theoretical concepts that are addressed in this chapter are: 1) ecological commons and TEK, 2) extractivism, 3) resource driven 'small wars' and 4) epistemicide (Korf, 2011; Weston & Bollier, 2013, Gudynas, 2015; Santos, 2016). First, the reader is introduced to the complex interplay between modernist epistemes on the one hand and TEK and ecological commons on the other. In ecological commons, both the conceptualization of development as well as knowledge deployed for this conception differ strongly from contemporary sustainable development models (Shiva, 2010). Secondly, the concept of extractivism shall be introduced, placing an emphasis on its historical link to colonialism and the adverse negative effects of extractive economies on conventional human development as well as alternatives to development (Mignolo, 2011; Gudynas, 2015). A third section addresses the concept of 'small wars' and violence that corresponds to resource extraction (Korf, 2011; Malamud, 2018), while a fourth section discusses the loss of TEK through the enclosure of ecological commons (Weston & Bollier, 2013). In a concluding section, the theoretical expectations are summed up.

2.2 Ecological commons, TEK and Western Modernity

This section explores the differences between ecological commons and TEK on the one hand, and modernist development models on the other. These latter models are preceded by ecological commons by Millennia but are rapidly replacing them (Sachs, 2010; Weston & Bollier, 2013; Esteva; 2014). Most definitions of TEK indeed emphasize its roots in local environments: 'The knowledge base of most indigenous science is rooted in place-based natural-history observations gathered over centuries or millennia, distilled in the lexicon, calendars, place names, maps, and other practices of indigenous resource managers. Indigenous scientific knowledge is in many ways complementary to— not contradictory or redundant with— academic science' (Wilder et al, 2016: 501). In this sense, Watson-Verran and Turnbull explore the term 'assemblage' to denote the workings of modern techno-science. An assemblage is an 'episteme with technologies added but that connotes the ad hoc contingency of a collage in its capacity to embrace a wide variety of incompatible components' (Watson-Verran & Turnbull, 2011: 3). This study accordingly employs a definition of TEK that draws on these observations: *Traditional Ecological Knowledge is the product of and conveyed in heterogeneous actor-networks that are performed through associations between people, other species, materials, bio-physical cycles, spiritual entities, institutions and technologies and continuously applied by members of a given community*, *mainly for sustenance*. TEK is complementary to natural sciences and is vital for

the conservation of ecosystems (Maclean, 2015; Wilder, O'Meara, Monti, & Nabhan, 2016; Tauli-Corpuz, Alcorn, & Molnar, 2018). Included in this knowledge is information about local biodiversity, sustainable use of resources or herbal medicines that provide remedies in regions where western medicine is not available (Wilder, O'Meara, Monti, & Nabhan, 2016). The continued uses and applications of TEK guaranty indigenous community's autonomy and also an alternative to western development models (Huaman, 2015).

Indigenous metaphysics legitimize the small-scale appropriation of nature for local sustenance, but not for large-scale international export and profit-making: Communities in ecological commons favor adapting to natural environments and cycles over completely transforming and dominating them (Shiva, 2010; Céspedes Melo & Niño Muñoz, 2014). Thus, indigenous lifestyles frequently clash with extractive activities on or near their territories, which in turn are legitimized and enabled by techno-science (Gudynas, 2015). Differences between western techno-science and indigenous knowledge systems manifest themselves in their relation towards nature as well as the aims of knowledge application (Mignolo, 2011): While indigenous knowledge puts strong limits on how nature can be appropriated and what it can be appropriated for, techno-science for extractive activities does not. On the contrary, from a techno-scientific perspective, the concept of 'resources' (Shiva, 2010) encompasses a drive to overcome nature's limits to material transformation, thereby propagating the large-scale transformations of ecosystems as well as human communities for the sake of economic growth (Gellert & Lynch, 2003; Gudynas, 2015). While techno-science endorses the extensive use of synthetic materials and complex, expensive technology in long supply chains, the bits and pieces involved in the re-production of indigenous knowledge are for a large part of natural, local origin (Wilder, O'Meara, Monti, & Nabhan, 2016, Weber, 2018). The substitution of plentiful natural materials with synthetic ones reproduces scarcity, while TEK deals at best with 'shortages' in ecological commons (Shiva, 2010; Esteva, 2014).

European conquerors introduced ways of theorizing about nature to the Americas that were alien to the indigenous societies of the western Hemisphere and the West-Africans who were captured as slaves: 'Thus the initial moment of the colonial revolution was to implant the Western concept of nature and to rule out the Aymara and Quechua concept of Pachamama [Andean deity, mother earth]. This was basically how colonialism was introduced into the domain of knowledge and subjectivity.' (Mignolo, 2012: 11). The dichotomy between 'humans' or 'culture' on the one hand and 'nature' on the other are symptomatic of western Modernity and its sciences as well as the failure to acknowledge the interconnectedness of human activity and the bio-physical instability that will characterize the Anthropocene (Kalonaityte, 2018; Wright, Nyberg, Rickards, & Freund, 2018). The relation between knowledge and nature in European modernity is one of 'mastery' and domination of the latter through the mobilization of the former (Mignolo, 2011: 11). Accordingly, western development models such as 'sustainable development' or 'green growth' differ strongly from alternative indigenous concepts, such

as ‘buen vivir’ in the Andes (Gudynas, 2016). The contemporary weak sustainability approach rests on the assumption that natural capital is substitutable with man-made capital, what is being sustained are the high levels of production and consumption which characterize industrial societies (Daly, 2007; Shiva, 2010). Extractive networks that deliver the materials necessary for sustainable development are grounded in western perceptions of reality and the appropriation or ‘mastery of nature’ (Mignolo, 2012: 11). Ecological commons and TEK, however, are established on vastly different assumptions (Escobar, 2016). Law (2011) demonstrates this in an Australian example: ‘in a European or a Northern way of thinking the world carries on by itself. People don’t *perform* it. It’s *outside* us and we’re *contained* by it. But that’s not true for Aboriginal people. The idea of a reified reality out there, detached from the work and the rituals that constantly re-enact it, makes no sense. Land doesn’t *belong* to people. Perhaps it would be better to say that *people* belong to the land.’ (Law, 2011: 1). Law is concerned with ‘one-world metaphysics’ here. The logic of the ‘one world’ places reality, including nature and materials, outside of the self, as if it were independent, continuous and taken for granted (Sachs, 2010; Law, 2011). Northern meta-physics are contested in the south: ‘the proliferation of struggles in defense of territory and cultural difference [by indigenous and other minority communities] suggests that what emerges from such struggles are entire worlds, which we will call relational worlds or ontologies.’ (Escobar, 2016). Many indigenous meta-physics or ‘relational ontologies’ (Ibid., 2016) follow a different vision of reality and nature, one that is not informed by a static containment of the self in reality, but rather of a ‘performance’ of reality involving humans and non-humans (Law, 2011; Escobar, 2016). Humans are part of the world, its environments, materials and resources, and the world is part of humans and their communities. This logic places strict limits on how much nature an individual may appropriate to satisfy basic needs. It recognizes that there is a balance in the earths systems that must be maintained at all costs. By following this logic and employing TEK, indigenous and subsistence commons have persisted in harsh environments for millennia (Shiva, 2010; Huaman, 2015). TEK is thus essential to the long-term survival of ecological commons (Weston & Bollier, 2013).

Reciprocity in human-nature relations is key to the performance of ecological commons (Weston & Bollier, 2013: 160). Resources are equivalent to gifts, which are to be treated with respect and not depleted short-sightedly (Shiva, 2010). Commons operate outside of the norms of public or private property, instead sharing natural actors or processes among a certain number of people (Weston & Bollier, 2013). Once private or public ownership of commons is established, they disappear (Esteva, 2014). National laws and private property conflict with customary or ‘vernacular’ law that is established locally (Shiva, 2010; Weston & Bollier, 2013). The violent enclosure of commons and the state-sponsored spread of markets into remote territories requires not only the removal of materials but also other ‘obstacles’, and in ecological commons these are practices and ways of knowing nature that conflict with the logic of infinite extraction and the ‘mastery of nature’ (Berthoud, 2010; Mignolo,

2011). As ecological commons are threatened by enclosure in many parts of the world due to growth-based extractivist activities (Sachs, 2010; Weston & Bollier, 2013; Klein, 2014), epistemological alternatives to modernist ways of knowing tend to disappear forever (UNDESA, 2019), even if so-called 'common-pool resources' can eventually be handed back over to communities (Weston & Bollier, 2013). This constitutes an avoidable loss of 'tools' for humanity to confront its home-made ecological crisis at the dawn of the Anthropocene. These 'tools', such as indigenous and subsistence communities' knowledge and practices regarding agriculture, local biodiversity and adaption to local natural processes, are crucial in a necessary transition from growth-based to sustainable human communities (Klein, 2014).

2.3 The Appropriation of Nature in Extractive Actor-Networks

This section focusses on extractivism, linking up with the second sub-question, which asks for the appropriation of nature in extractive actor-networks. Large-scale resource extraction particularly gained ground from the year 2000 onwards in Latin America (Gudynas, 2016), fueled by high commodity prices on the world markets (Gudynas, 2016: 47). The extraction of resources in Latin America and also Africa is fueled primarily by external demand and their consumption is highly unequal (Gudynas, 2014: 13; UNEP, 2016). North Americans consume around 30 tons of materials per capita (80 tons according to some estimates) and Africans 3 tons per capita (UNEP, 2016; Bridge, 2009: 1224). Global resource extraction has increased threefold since the 1970's and scholars estimate that if the human population reaches 9 Billion people by 2050, we will extract 180 Billion tons of raw materials annually, in comparison to 30 Billion tons in 2010 (UNEP, 2016) These numbers are dwarfed if one takes into account the 'shadow material economy', of materials that are displaced to extract the desired ones, but which are not commercialized and end up as waste (Bridge, 2009). Taking this shadow economy into account, humans possibly now move as much material than geological processes such as erosion and plate tectonics which were the major geological forces shaping the earth during the last 4.5 Billion years (Ibid., 2009). Despite significant advances in productivity thanks to science and technology (Bridge, 2009; Magee & Dezevas, 2017), there has been no 'dematerialization' in our productive processes in the last decades (Ibid., 2017). On the contrary, efficient production technology induces us to consume more raw materials per unit of GDP than ever before (UNEP, 2016), what Alcott (2015) terms the 'rebound effect'. Waste products from extracted resources such as fossil fuels are thereby returned to the biosphere at an equally disturbing level as they are extracted (Rockström, et al., 2009; Klein, 2014). As the extractive frontier has already devoured much of the easily accessible deposits and expands further (Tsing, 2003; Bridge, 2009; Klein, 2014), indigenous reservations and protected natural areas are increasingly in the focus of actors seeking access to resources (Conde & Walter, 2015; Gudynas, 2017). These areas inhibit a very high biodiversity and the

exploitation of their resources comes at higher environmental and social costs (Gudynas, 2017): The amount of energy needed to extract resources in remote places as well as the 'overburden' (the material removed to access resources) increases with time as easily accessible deposits are plundered first (Bridge, 2009; Klein, 2014). Terms such as 'overburden' which are employed in extractive industries pinpoint to a discourse that denies the value of the biosphere which sits on top of the resource to be commercialized, rendering its existence obsolete and undesirable in comparison to the profits generated through extraction (Klein, 2014).

Extractivism, as it is defined by the scholars that study this phenomenon, is thus 'the appropriation of large volumes of natural resources through intensive methods for globalized mass exportation [with little additional further processing].' (Gudynas, 2016: 13). Extractivism also encompasses the extensive use of *renewable* resources, such as forests and cropland, since these are often used in a manner which is no longer sustainable, for example in monocultures on rainforest soil (Acosta, 2012). In this sense, cocaine production can also be seen as an extractivist economy of enclave. The contemporary cultivation of high-yield breeds of coca plants in illicit mono-cultures in South America resembles that of other cash crops destined for export. Other renewable resources that can be mobilized in an extractive manner include large-scale hydropower and water in general, as well as other renewable sources of energy (Shiva, 2010; Gudynas, 2015). Especially hydropower projects have similar impacts as large-scale mining operations, transforming thousands of hectares of land and riverine landscapes (Gellert & Lynch, 2003). The displacement of peoples and materials is thus an inherent feature of mega projects for sustainable development such as large dams (Gellert & Lynch, 2003).

If colonialism and modernity are two sides of the same coin as Mignolo (2011) asserts, then extractivism provided the silver that molded this coin. Gudynas identifies four generations of extractivism in Latin America, generations that can be distinguished by the type of technology and energy applied in the process of extraction, as well as the scale of material mobilization and the spatial magnitude of extractive operations. The first generation 'corresponds to the colonial epoch', where human or animal labor were applied, and relatively little territory was occupied (Gudynas, 2014: 12). The second generation corresponds to the 18th, 19th and early 20th century. It refers to the increasing industrialization of extractive activities and their ties to external markets. Activities that pertain to this generation persist also today in certain regions (Ibid., 2014: 12). The third generation of extractive activities is currently reaching its climax. It refers to the intensive use of heavy machinery and the removal of millions of tons of material or the occupation of hundreds of thousands of hectares in the case of monocultures (Gudynas, 2014). The fourth generation is the one we are slowly entering, where extractive activities deploy immense amounts of energy, chemicals and other resources such as water, mobilize even more material than previously and source from qualitatively poorer stocks of resources or from reserves that are very difficult to access. Gudynas (2014) names as example for this generation

fracking. Resource extraction that violates human rights is denominated 'extrahection', which means literally to extract, to tear out something violently (Gudynas, 2014: 20). Extrahection is inherent to the third and fourth generations of extractivism, which would not make sense, economically, environmentally and socially, if they were properly audited in regard to violations of the rights of individuals, communities and nature (Ibid. 2014: 20). Rights infractions in these generations of extractive ativities are not accidental, rather they are a prerequisite to extraction and particularly affect indigenous and peasant communities in the immediate vicinity of extractive operations (Gudynas, 2014: 21). In terms of politics, Gudynas (2017) identifies a 'symbiosis' between corruption and extractive activities in Latin America, which typically amplifies the negative environmental effects of extractive activities. Actors that participate in extractive activities mobilize a variety of diverse (techno-scientific) arguments that support their activities, arguments which usually tend to minimize negative effects and exaggerate the alleged economic benefits of extractive activities (Shiva, 2010; Brownhill, Turner, & Kaara, 2012; Gudynas, 2014). These benefits, however, tend to accrue to a small elite while the negative effects are outsourced to local communities (Acosta, 2012; Klein, 2014; Gudynas, 2015). Instead of focusing on basic human rights of their constituents, governments tend to protect extractive corporations which they see as important contributors to revenue for funding their development (Esteva, 2014). Extractivism thus reinforces neo-colonial ways of reasoning, those opposed to extractive activities and resource-driven development often face oppression and exclusion (Acosta, 2012: 86). Latin American presidents have referred to protestors of extractivism as 'nation-backwardizers' (Valladares & Boelens, 2017: 1018), a term which alludes to the special relation between resource development and 'progress' in modernist societies (Sachs, 2010). Criticizing extractive operations openly in Latin America can be deadly, as critics of extractive activities are frequently assassinated (Gudynas, 2014: 20).

An extractive operation extends spatially beyond the site of exploration, as an entire infrastructure of transportation, maintenance, security and energy provision systems must be established (Gudynas, 2014: 20). Chronologically, extractive activities extend far beyond the present-day operations and their immediate effects: What is taking place is the removal and processing of materials in several months or at best decades that accumulated in specific locations for millions of years. The rates of extraction far exceed those of replenishment, which is what makes nearly every extractive activity unsustainable in the traditional or 'strong' sense of the term (Daly, 2007; Shiva, 2010): Large-scale sustainable mining is a myth. A mineral can technically be renewable, if it is recycled (Daly, 2007), but its extraction cannot. Every extractive operation and the industrial processes it feeds also extend far into the future, through climate change and species extinction for example (Rockström, et al., 2009; Klein, 2014). Extractive operations make use of modern science, but they also incorporate local knowledge and labor. From an ANT-Perspective, we can thus say that *Extractive Networks are assemblages of diverse actors that together appropriate nature by converting it into distinct*

'resources', which are extracted and exported from a given site to international markets. This process is categorized by a rapid disruption and reassembly of previously existing social ties in communities and between humans and natural entities in and around the sites of extraction, processing and transportation of extracted resources. Actors in extractive networks may be mineral deposits, geo-physical cycles, corporations, individuals, machines, concepts such as prices, rules and regulations.

2.4 Resource-driven 'Small Wars'

Resource wars cause suffering on a massive scale: Almost every contemporary violent conflict in the world is somehow tied to resource exploitation, in Afghan poppy fields, Colombian coca plantations (UNODC, 2018), Congolese coltan mines or Nigerian and Iraqi oilfields (Burgis, 2016). The causal relationships between the occurrence of natural resources and effects such as instability and civil wars are well-investigated, especially in fields concerned with governance and state failure. Quantitative studies have revealed for example that the mere existence of sub-surface resources prolongs already existing conflicts (Lujala, 2010). Where resources and conflict zones overlap, conflicts are often more economic than ideological in their logic: Combatants, especially rebels, do not need to win a war if they can survive by pilfering and looting (Keen, 1998). Even conflict participants who seem to be enemies may cooperate to increase their private rents from looting resources, which is evident in the corruption and cooperation between government officials on the one hand and rebels, drug cartels, smuggling barons and illegal miners on the other (Keen, 1998; Burgis, 2016). For combatants who do not enjoy international support or independent funding, looting local resources, taxing populations in conquered territories and producing drugs are ways to raise revenues (Keen, 1998). Over time, economic survival may surpass the initial grievances that led to conflict and the focal point becomes how to continuously control and exploit resources and people in conquered territory (Collier, 2009). This is certainly true for groups fighting in the Colombian civil war. The presence of resources in a countries' subsoil alone does not breed instability (Snyder, 2006), rather this depends on complex interplays between geography, institutions and the international economic context. Resource rents can also bolster authoritarian regimes, which can hold on to power through a 'shadow state', relying on patronage and military power (North, Wallis, Webb, & Weingast, 2011; Burgis, 2016). The rents that governments in weak states obtain from selling resources are easier to administer than a complex system of commercial and private taxation, their capture by a specific group is a huge win in economic terms, which is why resource-dependent states are at greater risk of coups d'etats and rebellions (Burgis, 2016). States where centralized resource rents present a significant portion of income, such as Colombia, are more likely to become 'limited access orders', where there is no state monopoly of violence and the allocation of rents as well as restriction to them is used to maintain stability (North, Wallis, Webb, & Weingast, 2011). Apart from the obvious economic incentives to violence in resource-

rich states, citizens may hold more grievances because the government does not depend on tax revenue and is not accountable to them (Collier, 2009).

In order to adequately describe the resource-driven conflict which is being fought among rebel groups, paramilitaries, and state security forces in the case-region, this research borrows the term 'small wars', a term coined by the war-historian Clausewitz (Clausewitz, 1966, in: Korf, 2011). The term describes a war that is not fought exclusively between sovereign nations, but rather between unequal belligerents and non-state-factions (Ibid., 2011). These conflicts tend to be politically and economically highly complex: 'In small wars, the boundaries between combatants and non-combatants, between war and peace, between fighting, looting and plundering, between politics and economics, are often obscured, transgressed, redefined.' (Korf, 2011: 735). The conflict combines political grievances with economic incentives for gaining access to resources and populations (Ibid., 2011). These types of war are not new, but perhaps more present nowadays. The invocation of fuzzy boundaries between political grievances and economic motivation of combatants is directly applicable to the kind of conflict experienced in Colombia since the latter half of the 20th century began. Access to resources and protection of certain conflict-supporting economic sectors play a central role in the Colombian civil war, where rebels and paramilitaries alike obtain funding from oil theft, gold and emerald mining as well as cocaine production, among others (Ortiz-Riomalo & Rettberg, 2017; UNDP, 2012). The third theoretical concept in this study is thus defined as a '*small war' over the control, access and exploitation of natural resources and populations with numerous and unequal participants that have overlapping but also conflicting goals and employ a variety of (violent) tactics to achieve these goals.* The analysis of these networks focusses on the methods employed by different armed groups (including the state) to enclose ecological commons and control territories. Forced displacement of indigenous and subsistence communities is one of the major causes of a disconnection with ancestral territories and the ensuing loss of TEK (UNDESA, 2019).

2.5. Epistemicide and the Enclosure of the Commons

The following section highlights how epistemicides are inevitable when ecological commons are enclosed violently, building on ANT's conception of social ties as being heterogeneous and network-like in their character. Decolonialists assume that the conquest of the Americas by Europeans gave them the comparative advantage over other civilizations to establish a global economy based on the exploitation, subjugation and subalternization of non-European peoples and their knowledges (Garcés, 2007: 219-224; Mignolo, 2012: 11). As Santos phrases it: 'Unequal exchanges among cultures have always implied the death of the knowledge of the subordinated culture, hence the death of the social groups that possessed it. In the most extreme cases, such as that of European expansion, epistemicide was one of the conditions of genocide.' (Santos, 2016: 149). The de-legitimization of

ecological knowledges, then but also now, is a pre-condition of large-scale extraction (Galeano, 2015; Burgis, 2016). The dichotomies placing subaltern colonized subjects on the other sides of the 'abyssal lines' which divided European and colonial societies were never overcome, they simply transformed (Santos, 2016; Mignolo, 2012): Religious dichotomies of non-Christian / Christian (Reconquista period) transformed into secular racial dichotomies of European / non-European (early colonial period) and later into dichotomies of a civilizational discourse of primitive / civilized. In the 20th century and the rise of the development discourse this gave way to developed / undeveloped.

Epistemicides of indigenous or rural subsistence knowledge cannot be separated from the enclosure or privatization of commonly accessible nature: 'The destruction of knowledge […] involves the destruction of the social practices and the disqualification of the social agents that operate according to such knowledges.' (Santos, 2016: 243). In conquests of territories by Europeans, epistemicides went hand in hand with the appropriation of common nature (Mignolo, 2011): In Latin America, 'the implantation of a mining economy would have worse consequences [for indigenous civilizations] than the fire and bloodshed of war.' (Galeano, 2015: 64). Grosfoguel (2013) identifies four major epistemicides / cultural genocides that occurred between 1492 and 1700, starting with the expulsion of Muslims and Jews from the Iberian Peninsula. The Spanish burned down the Andalusian libraries, at that time the most extensive in the world holding hundreds of thousands of works (Ibid., 2013). These same practices were directly transferred to and applied in the conquest of American civilizations such as the Mayas or the Incas, where the conquistadores burned 'códices' and executed knowledge holders (Grosfoguel, 2013; Galeano, 2015). Once the Americas were firmly under European control and the trans-Atlantic slave trade was established, the silencing of African and indigenous knowledges continued: 'Africans in the Americas were forbidden from thinking, praying or practicing their cosmologies, knowledges and world views. They were submitted to a regime of epistemic racism that forbade their autonomous knowledge production.' (Grosfoguel, 2013: 84). Grosfoguel also argues that witch hunts in Europe in this period constitute an epistemicide (Grosfoguel, 2013: 86). A key component in the enclosure of commons and the destruction of TEK is thus physical and psychological violence towards knowledge-holders, violence that ultimately seeks to put an end to the intergenerational transmission of knowledge that is created in commons.

One does not have to dig deep to find contemporary descriptions of how ecological commons are enclosed, typically for weak sustainable development (Daly, 2007), producing epistemicides of TEK: The government of Botswana for example is accused of exterminating the bushmen culture of the San people because they are in the way of the sustainable development of the Kalahari desert through diamond mining, safari tourism and big-game hunting (Vidal, 2014). This epistemicide could extinguish the oldest known human bloodline and a culture that precedes the Neolithic by dozens of millennia: The ancestors of the San people gave rise to modern humans 200 000 years ago (Mukherjee, 2016: 338-339). After having survived so long in the harshest of environments, such innovative people are

suddenly reduced to a population in poverty in comparison to their 'modern' compatriots, since the San have little monetary income and sustain themselves as hunter-gatherers. The modern state, seeking to alleviate this poverty, thus 'develops' both the people and the land they lived off (Shiva, 2010). In nearly every post-colonial state there are similar examples of communities that are forced to sever ancient relations to land and natural processes and become more integrated into the global economy. While it makes TEK redundant, this process reinforces both the need and the possibilities for more material extraction in sensitive ecosystems, at a time where both extraction and waste production need to be scaled down exponentially (Klein, 2014; Díaz, Settele, & Brondízio, 2019).

Defining epistemicide by the severing of social ties that support knowledge is applicable to many examples: The destruction of specific sites of spiritual significance destroys religious bonds. The privatization of land deprives indigenous peoples and subsistence communities of its uses (Shiva, 2010; Brownhill, Turner, & Kaara, 2012). When books are burned, their authors can no longer establish social ties to future readers. When Indo-Germanic women were burned alive they could not pass on their knowledge to future generations either (Grosfoguel R. , 2013). In sum, a 'successful' epistemicide implies that possible social ties that support knowledge reproduction are broken forever, leading to the eventual loss of this knowledge when the last person holding it has passed away or can no longer apply it. Contributing to and expanding the definition of epistemicide offered by the decolonial school, we can say that an epistemicide occurs, *when the social ties supporting a type of knowledge reproduction cease to be sustained. The heterogeneous social ties that knowledge holders established and performed continuously over generations and which held and conveyed knowledge radically shift their shape or are severed in processes that rapidly reassemble previously existing ties and introduce completely new ones or none at all.* Epistemicide is therefore an effect, similar to power (Law, 1992), that is performed through the enclosure of ecological commons for resource extraction and through resource conflicts, rupturing knowledge-bearing associations between communities, individuals and nature.

2.6 Concluding Remarks and Theoretical Expectations

We can now state that an indigenous and rural knowledge network is the product of heterogeneous relations maintained in reciprocal social ties with endemic natural actors (such as rivers) and that it has vastly different applications regarding the appropriation of nature than extractive networks, which shun the notion of reciprocity (Shiva, 2010). Epistemicide, when applying an ANT perspective to the originally decolonial definition, is the severing of heterogeneous social ties supporting knowledge reproduction (Law; 2007; Grosfoguel, 2013; de Sousa Santos, 2016). We can furthermore state that extractivism is the large-scale appropriation of nature for extraction and export in diverse networks, primarily for the purpose of capital accumulation (Galeano, 2015; Gudynas, 2015).

Extractive activities necessarily sever all kinds of social ties that existed in affected communities and between humans and non-human actors such as local species or landscape features that are displaced and altered (Bridge, 2009). They also introduce completely new social ties to indigenous and subsistence communities which are based on exploitative uses of natural resources, replacing cooperation with competition among community members (Brownhill, Turner, & Kaara, 2012). Most certainly, these activities also destroy social ties that supported knowledge-reproduction. The relation between extraction and violence is also clear: In weak states or non-sovereign territories, especially those already affected by armed conflicts, legal and illegal resource extraction have to be secured militantly and through the use of force (Korf, 2011; Malamud, 2018) The epistemological consequences of extractivism and resource wars have been neglected thus far in academia, demanding their inclusion in contemporary studies of political ecology. Millions of lives that currently depend on 'community held lands' and intact natural territories (Tauli-Corpuz, Alcorn, & Molnar, 2018) may become impossible due to conflicts and resource extraction in the current century (UNDESA, 2019). A lot is at stake if these commons are enclosed, liberating huge swaths of territory for unsustainable extraction at the same time that millions of formerly independent subsistence farmers demand employment in material-intensive industrial economies if they are to gain an income. The lower Cauca region can teach us how this process unfolds.

3. Research Approach and Methods of Inquiry: On retracing an actor-network

The objective of this chapter is to guide the reader through the processes of the research approach and design, the gathering of data and its analysis. The chapter describes and explains the methodological tools and how they serve to find answers to the research questions posed. The chapter is divided into four further sections. The first concerns itself with the research design. The second refers to the case selection, while the third section is concerned with the methods of data collection in the case region. It also introduces the interviewees and highlights the complications that arose here and were often far beyond what was anticipated by the researchers. The fourth section refers to the methods of data analysis and explains the coding scheme. Finally, a conclusion summarizes the methods and explains which steps shall be taken to answer the initial questions.

3.1 Research Design

The basic design of the research is that of a qualitative case study (Creswell, 2014). The study rests on a socially constructivist foundation, of which ANT is a particularly unusual strain. ANT emerged from Science and Technology Studies (STS) which is founded on four ontological and epistemological principles: '[…] that the social is heterogeneous in character; that all entities are networks of heterogeneous elements; that these networks are both variable in geometry and in principle unpredictable; and that every stable social arrangement is simultaneously a point (an individual) and a network (a collective).'(Law & Callon, 1997: 165). Since the original focus of this research was the role of indigenous and local communities in Science, Technology and Innovation projects funded by extractive activities, it made use of conceptual tools from STS from the start. It quickly became clear however, that not only were the communities sidelined in the planning and implementation of these projects, their knowledges and cultures were also rapidly disappearing. In order to challenge the diversity of threats and forces of change that confront indigenous and local communities, these forces must be observed, dissected, and reassembled conceptually (Law, 1992; Latour, 2005): It is easy to say that capitalism destroys nature, or that indigenous peoples are oppressed by quasi-colonial elites (Strathern, 1999; Mignolo, 2011; de Sousa Santos, 2016), but how are these processes organized, who and what participates, how and why? This research thus became more attuned to the status of indigenous and rural knowledges and ways of life in the case region, in particular the way they were being affected by the ongoing armed conflict and extensive resource extraction. In this sense, the study is a prime example for an 'emergent methodology', whereby the research topic and questions changed significantly after data gathering was initiated (Suter, 2012). The study thus progressed in an inductive manner: The central concepts, which were presented in the previous chapter, 'emerged' from the data

as it was being gathered (Ibid., 2012), following a reflexive process of introspection by the researcher in regard to the relevance of the research topic for public administration. As is typical of qualitative research and especially case-studies, this study does not attempt to test a hypothesis nor to generalize its findings, treating the case as an extreme example of the contemporary enclosure of ecological commons (Weston & Bollier, 2013). Nonetheless, assumptions concerning relevant findings for public administration and future research shall be presented in the conclusion.

The researchers' job in offering an actor-network account is to allow the actors to speak for themselves, heeding to three principles: Agnosticism or impartiality, generalized symmetry and free association (Philipps, 2007; Law, 2004: 102). Impartiality refers to an indifference of the researcher towards truth and falsehood (Law, 2004) as well as ready-made explanatory frameworks or theories (Latour, 2005). In this sense, ANT does not offer a 'framework' for social analysis: '[…] Its main tenet is that actors themselves make everything, including their own frames […]' (Latour, 2005: 147). It is the researchers' job to remain impartial to the actor's framework and not force them into one that renders them voiceless. An ANT account also abstains from investigating the truth or falsehood of statements (Law, 2004: 102). Symmetry in ANT then refers to the coproduction of 'nature' (reality, the material world) and 'culture' (society, the human world) and the methodological distinction that is arbitrarily laid between these spheres and influences their analysis in social sciences: 'When a hammer hits a nail, it is not social. But when the image of a hammer is crossed with that of a sickle, then it graduates to the social realm because it enters the 'symbolic order'. Every object was thus divided in two, scientists and engineers taking the largest part— efficacy, causality, material connections—and leaving the crumbs to the specialists of 'the social' or 'the human' dimension.' (Latour, 2005: 83). The arbitrary line that is drawn here limits severely what we can investigate as sociologists 'the incommensurability between the two [material and social] will render invisible the drawing of what we mean by social connections. How they are associated will be lost for good.' (Latour, 2005: 110). This study thus treats natural actors and processes occurring in the case region in the same way as human concepts such as corporations, laws and synthetic materials. How knowledge is mobilized in indigenous and subsistence lifestyles cannot be described without paying attention to how materials are mobilized. The same goes for extractive activities of course, which exist for the sole reason of moving materials. In order to reassemble an epistemicide, actors such as laws, rivers, minerals and knowledges must be described as nodes in a network, which together enact a specific reality. Retracing the assembly of heterogeneous actors' accounts for the different realities enacted in ecological commons or extractive networks, which operate on fundamentally different assumptions (Weston & Bollier, 2013; Klein, 2014; Gudynas, 2015).

The principle of free association in ANT then refers to the 'extension of methodological symmetry into ontology, into what there is.' (Law, 2004: 102). The ANT scholar should treat social events as natural events and vice versa. The principle thus refers to the observer's task of following

the actors and the associations they continuously rebuild as unbiased as possible (Callon, 1986: 4). This principle enshrines an a priori aversion to the application of grand social theories to explain away how heterogeneous actors are ordered to convey affects such as power or domination. ANT proponents maintain that standard sociology takes power to be some sort of static 'stuff', waiting to be unleashed by an organization or an individual, who is embedded in a material context (Latour, 2005). From an ANT perspective however, '[…] power, like society, is the final result of a process and not a reservoir, a stock, or a capital that will automatically provide an explanation. Power and domination have to be produced, made up, composed.' (Latour, 2005: 64). An actor, such as a large mining corporation, does not simply have power, it must be produced in an actor-network as an effect (Law, 1992). An actor-network, then, is not a theory explaining why the mining corporation *has* power. The corporation's exertion of power must be made visible as a continuous performance involving distinct actors, material and conceptual. Armed with this methodological insight, the *process* of power projection through actor-networks is emphasized over a presumably static distribution of power in society.

3.2 Case Selection

ANT relies heavily on empirical case-studies, as do most works in STS, since 'knowledge lies in exemplars' (Law, 2007). In this study, the case was chosen in the framework of a PhD thesis on regional innovation policies. The research project placed its focus on two extreme regions in terms of resource extraction: the Magdalena Medio region, where the majority of Colombian crude oil is extracted, and the Lower Cauca region, an extensive gold-mining area. The lower Cauca region is a vast expanse of land, 848 500 hectares, that is sandwiched between the central Andes mountain range in the south, the Serranía San Lucas in the east, the Serranía de Ayapel in the west and the coastal flatlands in the north. The region is bisected by two major rivers: The Cauca and Nechí, which directly sustain more than half of the regions 300 000+ inhabitants (Gobernación de Antioquia, 2016). Administratively, the six municipalities of the lower Cauca region (Caucasia, Cáceres, El Bagre, Nechí, Tarazá and Zaragoza) form a sub-region of department of Antioquia, of which Medellin is the capital. The region is underrepresented in the state and national legislative and fiscally dependent on transfers: The six municipalities together take in 38 Billion pesos in taxes but rely on transfers of another 172 Billion to sustain themselves (Camara de Comercio de Medellin, 2017). The case region is one of the poorest in Colombia, with poverty rates in some rural areas exceeding 82% (Gobernación de Antioquia, 2016). The principal economic activity in the sub-region nowadays is still open pit or alluvial mining, 70% of it dedicated to gold (Camara de Comercio de Medellin, 2017). The production of 'white gold', as the locals refer to cocaine, is another significant extractive activity. In its recent history, i.e. the last four decades, the case region has not experienced peace. Access to land, water, transportation routes, minerals, labor, extortion- and protection rackets define the historical and current trajectory of the

conflict, in which around ten different armed groups participate (Defensoría del Pueblo, 2018). At least two indigenous peoples inhabit the sub-region, the Zenú and the Emberá, while Nutabe indigenous communities are present southwest of the lower Cauca region (ONIC, 2019). According to data from 2005, there were approximately 4000 Indigenous and 42 400 Afro-Colombians living in the sub-region (Gobernación de Antioquia, 2016). The latter are descendants of the slaves that Europeans brought to Latin America between the 16th and 19th century. In addition to ethnic groups, the case-region is also home to communities of subsistence farmers (campesinos) and miners (barequeros). It is important to keep in mind that the attributes afro-Colombian, indigenous or campesino are not rigid distinctions, one individual could auto-identify easily as all three simultaneously.

3.3 Methods of Data Collection

The data collection took place during six months of fieldwork between February and August 2018. It was conducted in the framework of a doctoral thesis by E. Andrade-Sastoque, who investigates transformative changes in extractive economies. His research is conducted and supported by the University of Twente in the Netherlands and the Universidad Externado in Bogotá. The doctoral student assisted his researchers with advice on the conducting of interviews and on moving around in complex territories. Our research was particularly supported by the Centro de Investigaciones y Proyectos Especiales (CIPE) of the Universidad Externado in Bogotá. In the case region, much support was provided by the Universidad de Antioquia (UDEA), the state university which has a branch in Caucasia. This university provided the researcher with institutional and material support during the course of the investigation and in conducting a workshop, with much appreciated help from its staff and administration.

The data gathered in the course of the investigation consists of policy documents, scholarly articles and periodical reports, eye-witness accounts, personal and participant observations, photos, videos and most importantly open-ended interviews. Altogether, this study incorporates findings from 22 interviews with 25 individual respondents. Their identities are anonymized, especially since some of the respondents are under protection, having received death threats. The method employed for identifying and contacting interviewees was the 'snowball method', or respondent-driven sampling, whereby one interview respondent would refer to additional ones (Salganik & Heckathorn, 2004). The process of finding respondents used multiple sampling chains however, since respondents were from diverse backgrounds. Many of the initial respondents were also provided by the Colombian doctoral student who had constructed a database of respondents during previous fieldwork. The interviewees were from very diverse backgrounds, ranging from high-level officials in the departmental administration to academics, chiefs and traditional healers. 6 of the respondents auto-identified as indigenous. Most of the respondents qualified as social leaders in their respective field. 14 were civil

servants or political leaders. Only 7 respondents were females. The total interview material amounts to over 23 hours, with the average interview lasting between 45 and 75 minutes. The interviews were conducted openly, not imposing a fixed set of questions. A framework existed, but was not applied consistently, as the diverse respondents had differing areas of expertise. The security situation also affected the context of the interviews, as some of the respondents had received threats and had difficulty finding a safe and suitable spot for an interview. These interviews took place in public spaces or institutions. Other interviews took place in respondents' government offices in the state capitol Medellin, one was conducted in a rainforest while sitting on a tree stump and one participant observation took place in a wooden canoe on a branch of the Cauca river, together with a fisherman and his 8-year old son. The locations where data was gathered thus tended to reflect the loci where our respondents 'act'.

In addition to the recorded interviews, the research data consists of personal observations and notes taken during various excursions and daily life in the case region. The researcher visited sites of resource extraction, medium-sized and large-scale industrial operations, as well as sites of TEK reproduction and indigenous resistance, in local villages and even an indigenous protest march. Considerable time was spent together with members of indigenous and rural communities, especially school classes, in sessions that were mediated by teachers. These meetings yielded valuable insights into the daily lives of these communities and the re-production of knowledge there. The long distances and precarious security situation made travelling to these sites often difficult. During the period of field work, a hydropower project under construction spun out of control, forcing the closure of a major highway and the evacuation of thousands of residents. This also affected the ongoing research.

In addition to the aforementioned qualitative data sources, the study also relies on external scholarly literature, statistics as well as news coverage to developments in the case region. These data sources contribute to the accounts offered by the respondents in the interviews by offering insights into sites, situations and processes that were not accessible to direct observation for various reasons. This was the case with the Hidroituango hydropower project for example, which has a large impact on daily life in the case region but is difficult to access due to its remote location and the emergency situation. Documentation of extractive activities in scholarly articles and news coverage also serves to illustrate (not prove) the claims made by respondents, for example through providing figures on land distribution and usage in the case region: 'Land' in this sense is not some economic concept on which theories of inequality or power can be projected, it is a very real entity for the inhabitants of the lower Cauca region, there is a finite amount of it (some 800 000 hectares) and it can only be allocated and used in a certain number of ways, some of which tend to exclude alternative uses and allocations. Figures that depict land use and distribution thereby illustrate how land exerts an agency as an actor in an actor-network, with whom it gets to be associated and with whom not for instance.

The method of data gathering for ANT-accounts is very similar to standard ethnography, this is no coincidence. From the outset, this study relied on the theoretical foundations of STS. The focus sharpened with the adoption of ANT, which shares many elements with Garfinkels' ethnomethodology (Latour, 2005; Philipp, 2007), especially its reliance on case studies, focus on seemingly irrelevant activities and details, and its use of the concept 'actor' rather than 'informant', who is to be treated not as a mere placeholder but rather as an active and knowledgeable entity that shapes its own context. In Latours words: 'ANT is simply an attempt to allow the members of contemporary society to have as much leeway in defining themselves as that offered by ethnographers' (Latour, 2005: 41). Proponents of ANT are very skeptical about the arrogant positioning of observers by social scientists: 'since ordinary agents are always 'inside' a social world that encompasses them, they can at best be 'informants' about this world and, at worst, be blinded to its existence, whose full effect is only visible to the social scientist's more disciplined eyes; […]' (Latour, 2005: 4). This approach is also reflected in the way the interviews were conducted. Although a fixed set of topics existed, and the questions were phrased according to the identity of the respondent, most of the time the respondents talked freely, with little guidance or interruption by the interviewer. They would relate to their personal experiences of living and working in the case region, and whenever topics came up that were relevant to the research, such as resource extraction or the conflict, the interviewer would inquire deeper into the respondents' experience.

3.4 Methods of Data Analysis

There is no finite list of 'actors' that are featured in this study, as it is always possible to break down one actor into even more distinct actors: An actor is also and always a network (Latour, 2005). Any person, corporation or institution can be depicted as an actor(-network). For clarification, the category 'natural actors' used in the analysis refers to species, materials, or processes present in the case region. This could be a type of animal, an entire forest, a mineral or a river. An actor cannot be static, it has to do something, to transform something, exert agency on yet another actor. The property to act is not a property inherent to human beings only (Latour, 2005), as was discussed previously. A Network in an ANT account is nothing technical, indeed, a person can be network, or a text (Law, 1992). A network is what the researcher illuminates and describes: 'It is nothing more than an indicator of the quality of a text about the topics at hand. It qualifies its objectivity, that is, the ability of each actor to make other actors do unexpected things. A good text elicits networks of actors when it allows the writer to trace a set of relations defined as so many translations.' (Latour, 2005: 129). The configuration of a network in this sense is not static, the network is not constructed, it is performed (Law, 2007): '[…] the bits and pieces in the networks are not given in the order of things. Instead, they are relational effects. This means that their form, their content, and their properties are not fixed. Rather their

identity emerges--and changes--in the course of interaction.' (Law & Callon, 1997). In this sense, the data analysis is not a process that strictly precedes the writing of the text, it is the very process of writing the text.

The coding scheme emerged from a preliminary analysis of actor-networks in the case-region and their interrelation. The analytical tools employed in the analysis can be attributed to what Law (2007) terms 'new material semiotics'. This set of methods and assumptions distinguishes itself from the ANT studies of the 1980s and 90's in several dimensions: They place more emphasis on the performance instead of the social construction of networks, on the multiplicity of networks in a case, on their fluidity and the realities enacted in them (Law, 2007). From the perspective of the new material semiotics, instead of constructing an object or a fact, actors 'assemble and enact a set of practices that make a more or less precarious reality' (Law, 2007: 13). The static metaphor of construction can no longer serve to describe the continuity of certain effects such as power, which are not assembled once and then established, but rather continuously performed through a number of associations. The metaphor of enacting realities alludes to the multiplicities of realities and is also a rupture with most western metaphysical currents which are founded ontologically on a single static reality (Law, 2004; 2007; Escobar, 2016). Realities, the reasoning goes, are continuously crafted '[…] in a combination of people, techniques, texts, architectural arrangements and natural phenomena […].' (Law, 2004: 57). Each actor-network depicted in the analysis (ecological, extractive or violent) thus enacts a different reality. An actor-network is a description which retraces these associations, thus 'reassembling' how a specific reality is enacted (Latour, 2005).

Multiplicity refers to the simultaneous enactment of multiple networks in a single case. The case may be a human body, an airplane or a policy, but this object is not singular, not independent of the multiple ways in which it is enacted (Law, 2004: 51). Networks are no more than perspectives, of ways to engage with the case at hand. Multiple realities of a supposedly singular phenomenon are produced in different sites, be they spatially or chronologically distinct (Law, 2004). Multiplicity is often hidden in 'ontological singularity', by which the appearance of a coherent assembly of different parts is conveyed, tricking the observer into overlooking the multiplicity of the networks which actually make it up (Law, 2004). The observation of multiplicity in practice gives rise to a forced decision between 'Euro-American singularity', that is the assumption that there is only one reality, or plurality, 'the horrors of relativism', which render comparisons and translations impossible (Law, 2004). A third option employs what Law terms an 'empirical mode' of thinking, where one acknowledges that knowledges and cosmovisions 'overlap and shade off into one another' (Law, 2004: 63), they are 'more than one but less than many' (Ibid., 2004: 74). The data analysis in this investigation heeds to this 'empirical' approach. Empirically following the actors in multiple networks reveals 'partial connections' (Law, 2007). These can be pictured as two or more objects or concepts where each part incorporates parts of the others but cannot be reduced to its counterparts: An illegal mining site in the lower Cauca

region is a place where technology, weapons, policy texts and knowledge come together with natural actors and processes. Each of these actors contributes to the performance of the other actors in the site, none of these actors can exist in this network without being associated to the others: The mineral, far from being a static material far underground, exerts agency on humans, who attribute economic utility to its possession and thus proceed to mobilize machines and chemicals for its extraction, even if this is against the law and the presence of illegally introduced machines in specific areas (mining titles pertaining to multinationals) draws yet another actor on the scene: The military is mobilized to destroy the machines, while paramilitaries are mobilized to protect them. Describing this process as an actor-network bridges the arbitrary divide between what is deemed to be 'social' and what is 'material', enabling the retracing of heterogeneous associations established between grains of gold in the subsoil to a bullet fired in a confrontation over a mine.

Fluidity then refers to the possibility of an object or phenomenon to shift shape, for realities to adapt: A river can be perceived as a powerful patron of life, a complex performance involving various materials and species, or a simply a resource that can be harnessed and converted into electricity. The notion of multiplicity and shape-shifting implies that a network or a web of networks need not have a center, consisting of loosely associated realities that flow into each other (Law, 2007). Material-semiotic analysis also goes further than epistemology and ontology, and asks for politics, that is, for the 'goods' or 'bads' that are enacted in actor-networks (Law, 2007). Accordingly, the study also asks which 'goods' or 'bads' are enacted in ecological commons as well as extractive and violent networks.

ANT assumes, that a thorough or 'deep' description is equivalent to an explanation (Latour, 2005). The analysis thus consists of the re-tracing and describing of multiple actor-networks in the case region. By retrieving how the associations between actors and networks shift shape, are established and broken again, it becomes possible to offer a material-semiotic description of the loss of TEK through the enclosure of ecological commons. Extractive networks and networks of resource wars which occur in the same territory where ecological commons are enacted, reinforce one another, as was presented in the previous chapter. The analysis specifically focusses on providing descriptions of the 'nodes' through which these networks are established (Strathern, 1999), sites of extraction for example, or indigenous territories, where humans, technology and natural actors are assembled to convey an effect such as profit generation or sustenance (Law, 1986, 2007). Keywords that indicate the nature of these associations, for example 'extractive', 'respectful', form the bedrock of the coding scheme. A code is no more than 'a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data.' (Saldaña, 2008). The coding scheme then focused on portions of data that pinpointed specific mediators which constitute parts of actor-networks, such as specific laws or technologies. The concepts to be captured in the coding scheme were described in the previous section. The analysis seeks to retrace these concepts through the assembly of mediators in actor-networks, offering a description of how they

establish themselves and what the consequences of their interaction are.

Due to the large amounts of data collected, the data analysis was highly selective. Not all interview content was transcribed for lack of relevance. Of 24 interviews conducted, 23 were transcribed to a certain degree. The more information the interviews contained about the investigation topic, the more content was transcribed. Transcription was limited to Spanish summaries, whereby the most salient phrases, the ones that capture the central concepts, were transcribed literally, enabling their possible citation in the analysis. Of the 23 Interviews that were transcribed, 14 are directly cited in the analysis chapter. However, all of the 23 interviews provided relevant information which was included in the description of the actor-networks operating in the case-region. Some respondents are quoted multiple times, while others are not quoted once. Those that are quoted frequently often said similar things to respondents who are not quoted, however, their quotations were more apt for citation.

This deductive approach to data analysis thus consisted of several steps: After the process of interview selection and the transcription of the most relevant interview sections, a table was assembled where the most important associations between actors were charted. The table allowed for each actor to be associated with every other possible actor, revealing multiple and at times conflicting associations between them, for example between 'gold' and 'Zenú communities' on the one hand and 'gold' and 'multinational mining corporations' on the other hand. This table amounted to a rough sketch of the associations enacted in the different types of networks. This step was followed by a first draft of a text retracing these networks, which was built around citations that illustrate the observed associations and processes vividly. These 'exemplars' (Law, 2007), i.e. citations, that were presented by the respondents need not be filtered through some theory: They constitute, by their very nature as subjective experiences made in ecological commons, extractivism or armed conflict, parts of the actor-networks being reassembled. Drawing on these exemplars as well as other observations by the researcher or other scholars, the analysis retraces how ecological commons are ordered around the appropriation of nature with TEK, how extractive networks are ordered around the appropriation of nature with the aid of techno-science and the state as well as how 'small war' networks are ordered around ensuring access to exploitable nature by installing a rule of terror. The next chapter displays how these methods are applied to the data analysis.

Chapter 4: Analysis

In the following sections, the study retraces the heterogeneous associations between actors in ecological commons, extractive and violent actor-networks in the lower Cauca region. The first section concerns itself with ecological commons, TEK and the importance of nature in indigenous and subsistence communities, contrasting these findings with the role of nature in contemporary western development models. In the second section, this exercise will be repeated for five different types of extractive actor networks, which revolve around the 'extrahection' of natural actors. The third section refers to the associations between extractive actors and those engaged in violent conflict, which cooperate to ensure possibilities for extraction. In the fourth section, these insights will be summarized and interpreted in regard to the primary research question. This section displays how the overlapping of these networks encloses ecological commons, thereby de-legitimizing TEK and contributing to its epistemicide.

4.1 Ecological Commons and TEK in the Lower Cauca Region

At least three pre-Hispanic indigenous societies have survived until present day in the case region and neighboring municipalities, in addition to communities of Afro-Colombians, typically descendants of runaway slaves (Galeano, 2015). In pre-Hispanic times one of the three indigenous peoples of the region, the Zenú, had established a sophisticated agricultural society on the coastal plains. Zenú society was divided into three kingdoms, Finzenú, Panzenú and Zenufana, each specialized in certain 'products' (food, jewelry, arts & religion) and connected to the others by an intricate trade system based on canals and roads (ONIC, 2019). The Emberá also survived the arrival of the Europeans, they still inhabit northern and western Colombia as well as parts of Panama (ONIC, 2019). The Emberá maintained semi-nomadic lifestyles along rivers and in deep rainforests. Two related groups of Emberá are recognized in the case-region, the Emberá Eyábida or Emberá Katio 'people of the rainforest', and the Emberá Dóbida, 'people of the river' (ONIC, 2018). The center of what is now Antioquia was then populated by the Nutabe, who now inhabit the Cauca canyon to the southwest of the lower Cauca region (David Higuita, 2018; ONIC, 2019). Although they have adopted many modern technologies and certain modern cultural features, the Zenú, Emberá, Nutabe and Afro-Colombian communities in the lower Cauca region still make extensive use of traditional ecological knowledge and are highly dependent on access to nature, which they share and organize in systems that can be pictured as 'ecological commons' (Weston & Bollier, 2013).

All of these groups are survivors of prior genocides and epistemicides. As one indigenous representative explained:

> ‘The indigenous peoples that are here today are not really alive but merely surviving, [survivors] of a wave of attacks, religious, educational, from the government in every sense. […] They taught us to depreciate ourselves, to hate ourselves to the point where many ancestors negated their identity towards their children and grandchildren.’ (Respondent 5)

Despite the survival of indigenous genes, indigenous culture was swiftly exterminated through the negation of indigenous identities. The waves of attacks’ described by the respondent began during early colonization, when the Spanish captured indigenous populations that survived the initial wave of lethal infectious diseases and began importing enslaved Africans to work in gold mines and plantations, thus establishing the ‘Atlantic Economy’ (Mignolo, 2011). After indigenous populations had been decimated by as much as 90%, the Spanish crown officially called upon the colonies to end slavery. Unofficially, the crown continued its support of slavery and the ‘encomienda system’ was born in 1536 (Galeano, 2015). In 1773, the Spanish crown established a reserve for the Zenú in San Andres de Sotavento (ONIC, 2019). The Nutabe for their part were confined to a large reserve in San Pedro de Sabanalarga in the Cauca canyon, which was dissolved with a pen-stroke by the newly founded Colombian republic in the 19th century (ONIC, 2019). In mid-20th century Colombia, during the aptly-named period known as ‘La Violencia’, many rural and indigenous communities were uprooted by large landowners and migrated to previously unpopulated areas (Galeano, 2015). According to our respondents, most of the indigenous settlements in the lower Cauca region were (re)founded around this time by communities that sought to flee the violent enclosure of their commons elsewhere.

Historically, interactions between Colombian indigenous communities and state institutions such as municipal or departmental governments or security forces were often detrimental to the former. The tide has shifted slightly in recent decades, evident in the Colombian constitution of 1991, which in principle recognizes the ethnic diversity of the nation and holds the state responsible for upholding the rights of ethnic communities. Indigenous respondents acknowledged however, that the recognition of diversity existed on paper only. Relations between their communities and state institutions were still fraught and characterized by neglect, a municipal Zenú chief confided:

> ‘There are no guarantees for our proper [indigenous] education. […] The children receive classes under a tree, from there on they have to graduate from high school, in a place where there is no internet, nothing. […] The problems concerning health are even worse.’ (Respondent 21)

In May 2018, the indigenous peoples of the lower Cauca region organized a ‘Minga’ or protest march, to call attention to their state of neglect (cf. ONIC, 2018).

Most indigenous communities in the case-region rely on the services of traditional healers, but would like to have access to systematic and intercultural health care provision, as a respondent working in an indigenous mental health program explained:

> 'Indigenous communities have been insisting for many years now that they have to have a proper system of intercultural health provision. […] The approaches that the [national] government then brought forward, however, did not comply with the requirements of SISPI [Indigenous System of Proper Intercultural Health].' (Respondent 22)

Intercultural health care, as our respondents explained, would combine methods of Zenú or Emberá medicine with modern western medicine, in ways that contribute to the preservation of indigenous knowledges, for example in regard to herbal medicine or local indigenous foods. At the same time, indigenous respondents maintained that while western medicine was theoretically capable of delivering much better results than traditional medicine, it was not accessible to many people and not applied in a holistic sense, emphasizing the treatment of symptoms with pills over addressing the root causes of illness.

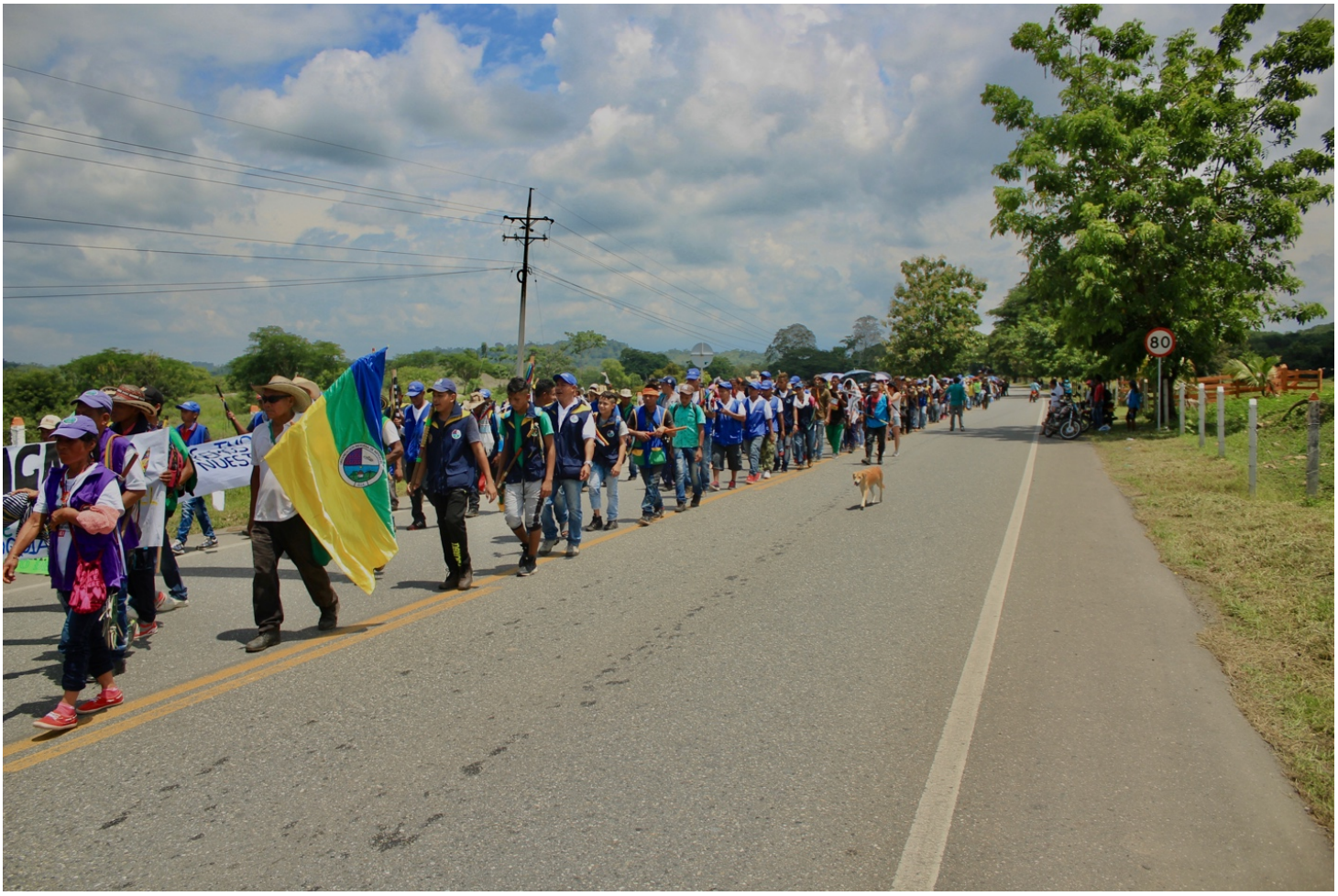

Image 1: Indigenous protest march or 'Minga' near Puerto Bélgica, May 2018

At the same time, traditional medical knowledge is disappearing. A Zenú healer explained to me, that it used to be common to order plants not available in the specific climatic zone from healers located in different climate zones, i.e. higher up in the mountains. This system is not being applied as consistently as before and healers are therefore losing contact to one another, forgetting about specific practices and herbal medicines.

While indigenous communities near urban centers can receive 'standard' modern medical care in clinics there, in communities far off the grid, the absence of any kind of modern health care provision, paired with the loss of species with medical application or traditional medical knowledge, can be deadly: In a visit to an Emberá community deep in the forest in paramilitary-controlled territory, I noticed that the community had no access to any kind of reliable health care (neither modern nor intercultural), one child was experiencing a severe but apparently untreated infection. A day after our visit, an infant in this community died of malnutrition, which is still among the three main causes of death in 1-year old children in Colombia, with higher prevalence rates among rural and ethnic communities (Cotes-Cantillo, et al., 2016). The respondents working in the indigenous health program emphasized the relationship between changes in land use and malnutrition in indigenous communities which they had witnessed in their work in the Guajira department in northern Colombia:

> 'One of the causes, if we are to speak of economic reasons [for infant malnutrition], is simply this neoliberal and extractivist model. Why? For example, because land in the Guajira is not used for agriculture or pastures anymore […] Instead, it is [perceived to be] rich in 'natural resources' […]' (Respondent 22)

Extraction in the 'resource-rich' Guajira department but also in the lower Cauca region gains prevalence over the permanence of indigenous populations, and, as the respondents continued, indigenous communities in Colombia have committed communal suicides as responses to extractive projects on their territories, pinpointing the helplessness and the despair experienced by these communities in the face of the complete disruption of their systems of sustenance and meaning-making. Suicide rates for the Colombian Emberá population are estimated at 500 per 100 000[1] (Gómez-Restrepo, Rincóna, & Urrego-Mendoza, 2016: 124). Not speaking Spanish, Emberá rarely leave their forest villages to seek treatment. These numbers indicate high levels of psychological distress caused by extractive activities in ecological commons, in addition to negative effects on physical health such as malnutrition or cancer-causing pollution (Klein, 2014; Cotes-Cantillo, et al., 2016). Ethnic communities' rights to their own educational and health care systems are not being respected by the

[1] For comparison, the suicide rate for the Netherlands is estimated to be at 11.1 per 100 000 residents, according to Netherlands Statistiks, 2017.

state, which largely leaves communities in the lower Cauca region to fend for themselves. These in turn rely heavily on the support of indigenous NGO's such as the Indigenous Organization of Antioquia or outside agencies such as USAID, which lack substantial funding or only support specific projects, however. The national governments neglect of intercultural education or health approaches thus constitutes structural violence which reinforces indigenous identity loss and fosters human suffering from preventable health problems (Farmer, 2009).

The conceptions of 'development' in ecological commons in the case region differ strongly from the Colombian 'sustainable development' policy which is characterized by the hypocrisy of demanding material growth at the same time that it demands that future generations possibilities' for sustainable resource use be maintained. 'Development', is seen by indigenous peoples in the case region as a repository of empty promises, adding the prefix 'sustainable' did not alleviate this. When referring to the Hidroituango hydropower project under construction to the south-west of the lower Cauca region, the Zenú representative from an indigenous organization explained that:

> 'They have been giving us development for a long time but what they have promised has not materialized. Development is like a grand idea, in the future, ahead of us, that they conjure up to make us pass through all the hardships.' (Respondent 5)

While western models of development are heavily dependent on long supply chains such as those established through hydropower projects (Gellert & Lynch, 2003; Shiva, 2010), indigenous conceptualizations of development emphasize the use of TEK and short supply chains for personal sustenance:

> 'What is development? That you have a place to cultivate [your crops]. If you have a piece of land you may be ignorant, but at least you don't go hungry.' (Respondent 14).

In the experience of many respondents, sustainable development projects are presented as beneficial in the future, a kind of appeasement politics that obliges reluctant local populations to accept negative consequences in the present, while they know that any benefits will be collected by those who organize these projects and not those whose commons tend to be privatized through them. The application of ecological knowledge for subsistence lifestyles is deemed to be 'ignorant' by developed societies, which instead rely extensively on science, labor-specialization and high-tech to establish the supply chains necessary for quenching the large material demands of these societies (Berthoud, 2010; Gómez-Baggethun, 2015; UNEP, 2016). In the experience of this respondent however, ecological knowledge gets the job done: He is no longer hungry, his material needs are satisfied by the land he lives on.

For many indigenous people, the ecological commons that satisfy their basic vital needs is denoted by the term 'territory'. An indigenous town hall representative (who was forcibly displaced twice from her land), emphasized that territory cannot serve the purpose of capital allocation:

> 'We don't have territory and without territory an indigenous person does not live. Our life is related to our territory, because with it you have the most important thing, mother nature to provide for you, with her you have everything to live well. We do not think in money, an indigenous person doesn't want to have big mansions, she needs her territory.' (Respondent 25).

Territory thus understood can be conceptualized as an actor-network of natural actors and processes that enables a community to survive. Territory denotes the assemblage of natural capital from which indigenous and subsistence communities gain an income. This income, in the form of food, water shelter, medicine etc… must be derived sustainably, i.e. without decreasing future yields, otherwise it would not be income but capital drawdown (Daly, 2007). In terms of ANT: no component or actor in the actor-network denoted 'territory' should shift its shape in a way that endangers the establishment of future associations between this actor and others. If a river becomes progressively more polluted, as is the case with the Cauca river, a fisherman's son will not be able to establish the same type of associations with the river than his father who fished in unpolluted waters, catching more fish with less toxins inside of them. Ecological commons are understood by indigenous interviewees as one of many parts of a complicated system that must be balanced, not only in respect to material flows, but also in terms of reciprocity with 'mother earth'. As an indigenous representative reminds us:

> '[in the Zenú culture] The fact of preparing the hills [for sowing crops] does not only imply the preparation itself, but to enter into a dialogue with the mountain, to shout at the mountain. We have this thing that we term 'the call to the mountain', when we go to collect the harvest, and depending on that call, you either harvest productively or not. Who is going to certify that scientifically? No, that is an intrinsic relation between our culture and territory.' (Respondent 5)

Such an indigenous understanding of territory points to alternative knowledges and usages of nature that must necessarily conflict with the extrahective nature of large-scale resource extraction. Indigenous practices are embedded in cosmovisions favoring adaption to ecological capacity. These practices manifest reciprocity in human relations with natural actors: Resources and 'mother earths' provisions and services are seen as gifts (Shiva, 2010).

Cooperation among community members without the incentive of private profit is central to the functioning of ecological commons. Certain subsistence commons are organized through the collective maintenance of common infrastructure and public spaces. A workers' representative explains that:

> 'The first Monday of every month we gathered for the *colectivo*. What is the *colectivo*? All the men in the village went to repair the road, or the bridge […] while the women stayed in the village and cleaned the houses and streets.' (Respondent 6)

In indigenous commons, cooperation goes even further than simple maintenance, encompassing practices that contribute to sustenance, for example in agriculture, as a Zenú chief explained:

> 'There is a time when we collectively prepare the hills or an extension of land, 10 or 8 hectares, and then we plant it collectively. […] Afterwards, we repartition the harvest equally among ourselves.' (Respondent 21)

Collective actions establish functions and services in ecological commons which are typically provided by states' or markets in growth societies, such as infrastructure maintenance or food provision. Thereby, these communities establish not an alternative economy but a downright alternative to economy (Esteva, 2014): They resist the individualization and alleged self-interest that characterize utilitarian social relations in growth societies (Romano, 2015). A Zenú community's 'economy' does not rely on competition but on cooperation (Berthoud, 2010).

In the ordering of ecological commons, indigenous and subsistence communities in the lower Cauca region enact rules or 'vernacular law' to organize their territories (Weston & Bollier, 2013). These rules regulate activities such as traditional mining or agriculture, balancing them with other needs of human and non-human actors. As a municipal Zenú chief explained:

> 'This part [of our territory], we'll use it for cattle grazing, this part for agriculture, and this part we'll conserve for fauna. […] If you need wood for a house, you can cut it there, but you have to plant a new tree.' (Respondent 21)

Vernacular law can thereby be more effective at species conservation than governmental top-down approaches to land management. The chief of a Zenú community that lives in the Serranía San Lucas forest reserve explained, that

> ‘Deeper in the forest, there are large haciendas, illegal logging, you can find everything there. […] San Lucas has been exploited by a lot of mining […] But precisely the territory where we are living has not been touched by these types of mining activities.’ (Respondent 27)

It is no surprise that indigenous communities are more effective in conserving crucial ecosystems than governments in weak states (Tauli-Corpuz, Alcorn, & Molnar, 2018): While the Colombian government can only fly over the forest reserve with helicopter gunships for fear of armed groups, indigenous communities are on the ground permanently for generations, noticing the slightest changes in the environment while resisting the intrusion of unsustainable land uses such as large-scale illegal logging in their territories. The intricate relations between humans and natural actors established in ecological commons are exemplified in a study regarding indigenous mental health in Colombia: Closer proximity of indigenous peoples to forests measurably improves their mental health state (Cotes-Cantillo, et al., 2016).

Ecological commons rely extensively on undisturbed endemic natural actors and processes for their functioning, local species of fish for instance or seasonal monsoon rains (Weston & Bollier, 2013; Klein, 2014). Their survival is at risk with both the privatization of commonly accessible nature, its degradation or transformation as well as the replacement of natural through non-natural materials such as plastics or chemicals. Independently of one another, several respondents told us that the Zenú used to know of a plant extract for gold separation, which was replaced by mercury amalgamation during Hispanic colonialization. Mercury is the most toxic non-radioactive element known to exist. Mercury pollution was already rampant in the 16th century in mines in Latin America, its toxic effects were known as far back as the Classical Period (Galeano, 2015). After more than 500 years of mercury pollution, in 2018, the state of Antioquia determined the use of this heavy metal in gold mining to be illegal. Traditional miners who have learned to use mercury are still complicit in mercury pollution and hence the destruction of their own commons in the lower Cauca region, which depend on unpolluted water sources (Oseas García a, Cordy, Suescún, Molina, & Roeser, 2015: 245).

Water cycles and rivers are arguably some of the most important actors and processes for indigenous and subsistence communities. The Zenú, as various of our interviewees remind us, once maintained the largest hydrological manipulation by humans in pre-Hispanic America, which was found to be far more efficient than contemporary flood control in the region (Céspedes Melo & Niño Muñoz, 2014). Instead of blocking the waters flow, the Zenú channelled it to where they needed it for irrigation, to fill transportation canals or fish farms (Ibid., 2014). The rivers seasonal dynamics still shape the daily life in indigenous and subsistence commons. An indigenous representative explained to us:

> ‘In winter [the wet season] there is fish. When the waters rise, the fish enter the rivers from the lakes and swim upriver to spawn. When the rivers subside [in the dry season], they leave sediments and gold, so the people pan for gold. […] the biggest company we have in the lower Cauca region is the Cauca river.’ (Respondent 5)

The rivers are fundamental natural actors for indigenous peoples and subsistence communities of traditional miners and fishermen. Note the analogy between a river and a company presented by the respondent. The lower Cauca region has never experienced economic development beyond the extraction of primary materials, a typical destiny for rural regions in Latin America (Galeano, 2015). Here, life in indigenous and subsistence communities still depends overwhelmingly on renewable natural resources which are appropriated individually or collectively with pre-industrial methods. Rivers and forests are to these communities what companies are to the citizens of a ‘developed’ country, producing goods to satisfy the needs of consumers.

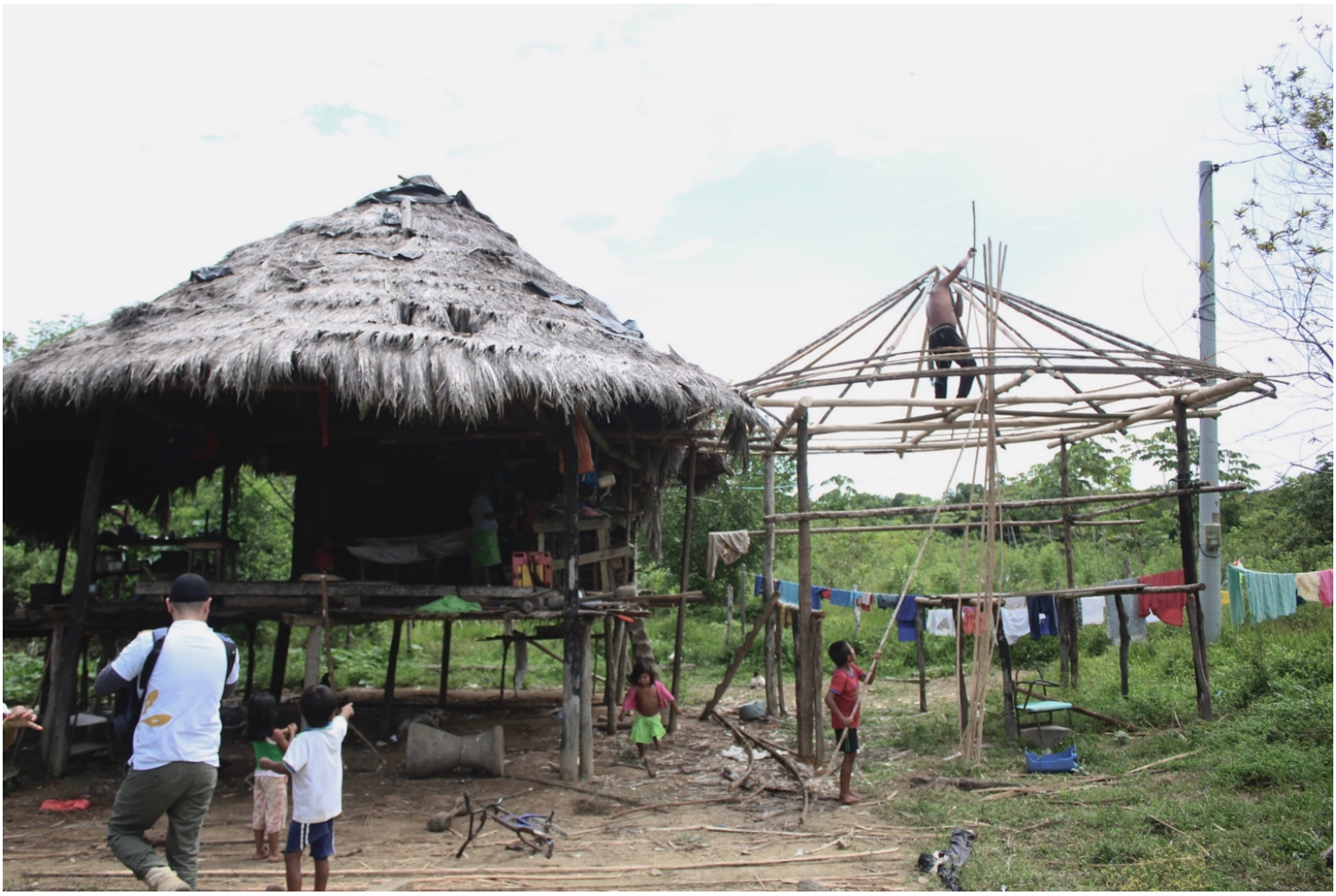

Image 2: The construction of a new Emberá house with local material obtained from the old house and the forest using TEK and family labour

Rivers are actors at risk of being mastered, while other natural actors and ecological practices are being replaced by the introduction of synthetic materials in the lower Cauca region. Concerning the substitution of natural by synthetic materials, an indigenous representative said:

> 'We are accustomed to packing our food in a large leaf of the *hoja de bijao* plant. You ate the food and left the leaf, and nature reabsorbed it. *No pasaba nada*. Now, they pack food in a plastic bag and those who are accustomed to throwing away a leaf, throw away a plastic bag.' (Respondent 5)

The loss of TEK is fuelled through the substitution of plentiful natural materials through scarce and synthetic ones (Shiva, 2010). This empowers corporations that control and produce these materials while it fosters the increasing dependence of indigenous and subsistence communities on means of production outside of their control (Galeano, 2015). By employing TEK and naturally occurring materials, for example in the construction of an Emberá house as pictured in the image below, indigenous and subsistence communities maintain short supply chains in practically closed economies. TEK is thus central to the resistance of indigenous and subsistence communities to an involuntary integration into the global economy (Klein, 2014), an integration that would rob them of the control over their means of production.

TEK is also central for resistance to violent and extractive power structures that seek to establish themselves in the case region: At one point, paramilitaries enforced an economic blockade of a specific area in the lower Cauca region in the foothills of the Serranía San Lucas. It was only possible to enter goods with the permission of the paramilitaries and state security forces. The representative of a small miners and peasants organization shared his experiences with us:

> 'They [paramilitaries] had a checkpoint, two hours from the town. If you had the three signatures [from police, military and paramilitaries], they let you pass the checkpoint, if not, they killed you. Many comrades died trying to enter goods […] What did we do? Well, we said, lets implement a closed economy here in the region.' (Respondent 6)

The organization of small miners and peasants fostered agro-ecological production and permaculture gardening with home-made organic fertilizers, since chemicals could not be imported due to the blockade. The knowledge necessary for these practices was in part acquired by regional activists during visits to Venezuela, then governed by Hugo Chavez, which were sponsored by a Colombian peasant organization. In the lower parts of the blocked-off region, the farmers grew crops and held livestock:

> ‘These products were brought to the upper part of the region, where only mining was practiced, initiating a kind of trade […] Milk, cheese, all of that went to the upper parts, and there the peasants did not have money but paid with gold. […] (Respondent 6)

The aim of this ‘closed economy’ based on TEK and cooperation was for traditional miners and subsistence farmers to remain in their territories despite the pressure of paramilitaries to relocate. In the end, they persisted until the paramilitaries lifted the blockade under international pressure.

This analysis of the ordering of ecological commons around the appropriation of nature with TEK reveals various findings. Ecological commons in the case-region constitute alternatives to conventional western development, placing a special emphasis on reciprocal relations with natural actors (Shiva, 2010; Esteva, 2014). This conceptualization is captured in indigenous understandings of ‘territory’ (Escobar, 2016), also in Zenú and Emberá communities in the case region. Communities that establish ecological commons rely on collective action and cooperation to perform crucial functions that the market and the state can or should not provide in these communities in the lower Cauca region (Weston & Bollier, 2013; Romano, 2015). Indigenous and subsistence communities utilize ‘vernacular law’ (Weston & Bollier, 2013), which typically rests on combinations of traditional authority, communal practices, common sense and direct democracy in these communities. Furthermore, TEK is important to the resistance of indigenous and subsistence communities to extractive projects and oppression. TEK increases the resilience of communities off the grid (Wilder, O'Meara, Monti, & Nabhan, 2016) and fosters sustenance via shorter and more sustainable supply chains (Shiva, 2010), for example through permaculture gardening, hunting and gathering or seasonal economies. Adapting to local natural processes and actors such as the constantly changing rivers is crucial to the functioning of ecological commons. These findings are not necessarily new, as Escobar (2016) demonstrates in the Colombian Pacific. However, they have as such never been established for the indigenous communities in the case region, which have thus far been neglected in academic research. Not even Alexander von Humboldt mentions the Zenú or their pre-Hispanic hydraulic works in the description of his visit to the Colombian coast and Sínu river.

The primacy of intact natural actors, processes and community relations is key not only to TEK’s success, but also to its precariousness. Orally transmitted and empirical knowledges are more susceptible to disappear (UNDESA, 2019), as happened with the Zenú who lost their language and most of the knowledge encoded in it. The ongoing loss and substitution of TEK with synthetic materials and their uses corresponds to increasing environmental degradation and poverty in these communities (Gellert & Lynch, 2003). The increasing scarcity of natural actors thereby replaces cooperation and collective appropriation of resources in ecological commons with competition, individual struggles and the utilitarian appropriation of nature as input for industrial processes (Brownhill, Turner, & Kaara, 2012; Conde & Walter, 2015; Romano, 2015). Also, only slight modifications in one natural actor such

as a river can have catastrophic consequences for subsistence communities that depend on multiple uses and the seasonal dynamics of this actor. The remaining subsistence and indigenous communities in the lower Cauca region are the survivors of previous and ongoing waves of attacks initiated by European colonization. Typically, oppressive power structures discredit subsistence lifestyles and exert pressure on them, for example through economic blockades or neglect. The neglect of the Colombian state's institutions in issues of indigenous intercultural education and health approaches, along with the lack of basic security provision in a conflict zone, threatens the continued existence of ecological commons, whose members do not enjoy their constitutional and internationally ratified human rights to proper education and medical treatment, nor security from armed groups (Defensoría del Pueblo, 2018). This disincentivizes the permanence of community members in ecological commons, who are forced to displace themselves to urban areas and adopt modern lifestyles, albeit in poverty. It is a life in constant limbo, caught in a 'weak mixture of lost tradition and unaffordable modernity' (Latouche, 2004). For administrations charged with the welfare of marginalized populations, this is problematic. The poverty of these displaced populations could have been prevented if their permanence in their territories and the ecological health of territories were guaranteed. In regard to rights this is the case, in practice it is not, as we shall see in the preceding sections.

4.2 Moving mountains: Extractive Actor-Networks in the lower Cauca region

The following section describes the ordering of five distinct types of extractive actor networks around the appropriation of nature in the lower Cauca region. This region hosts an extractive endeavor of the 3rd generation, the world's largest alluvial gold mining operation, and Colombia's largest hydropower plant, which could be categorized as a 4th generation extractivist project. Additionally, illegal gold miners, ranchers and drug traffickers compete for access to land and minerals. This section examines both state-supported and illegal extraction, focusing on a large gold mining company, a hydropower project, and extensive cattle ranching. These are economic activities that are actively fostered as contributors to sustainable development or at least tolerated by the government in the case of cattle ranching. In addition, the section discusses the production of cocaine and the illegal gold mining sector, extractivist activities that are vital for the Colombian war economy but persecuted by the national government.

One company in the lower Cauca region, Mineros S.A., controls more than 130,000 hectares of mining titles, amounting to closely fifteen percent of the entire area of the region and more than a quarter of all areas destined for mining there (Betancur, 2017). Mineros S.A. is a state-supported extrahective actor-network firmly embedded in power-structures, such as global mineral markets, that cater to growth societies' material demands. The company is owned by a number of national and

international shareholders, among them Scotiabank (Canada) and, through the financial services institute CorfiColombiana, Luis Carlos Sarmiento Angulo, the second-wealthiest Colombian with a net worth of USD 11 Billion. High-tech barges on the Nechí river move hundreds of thousands of tons of material day and night, concentrating gold-sand which is picked up by helicopter, smelted into bars and exported. Each barge can extract 500 cubic meters of alluvial deposits per hour, working day and night. Mineros' 800+ employees thereby manage to extract around 2.8 tons of gold a year. The extraction benefits principally the international and national shareholders of the company, leaving almost nothing but externalized costs for local riverine communities.

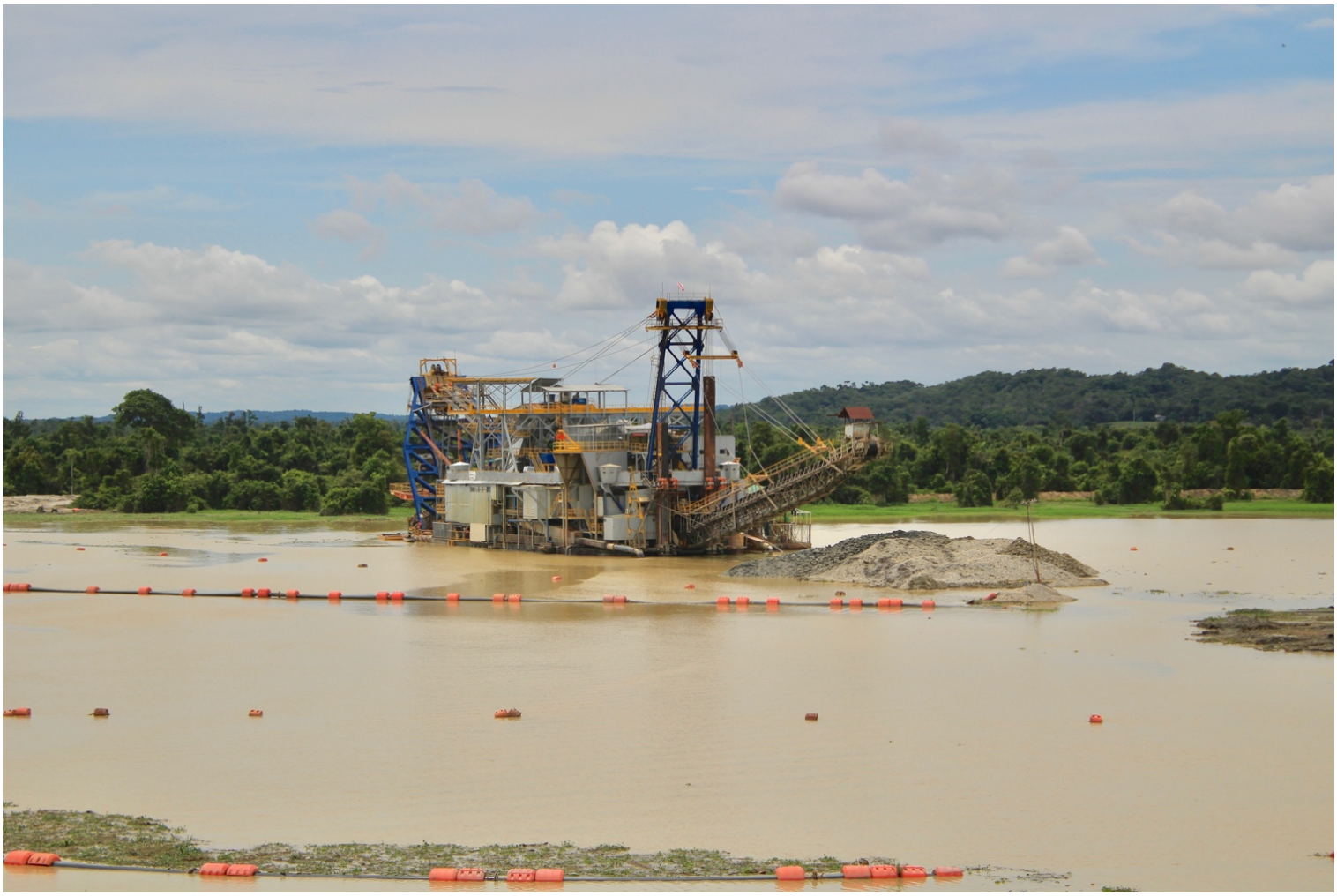

Image 3. Converting natural into man-made capital through high-tech: The largest alluvial gold mine in the world, operated by Mineros S.A on the Nechí river

One mining title the company holds is a remnant of Spanish colonial law, endowing the company with ownership of soil and subsoil. These 'perpetual' mining titles, exempt through successful lobbying from the nationalization of Colombia's subsoil in the 1991 constitution, have important implications for communities in the area, according to a respondent who investigates the company:

> ‘Normally, a mining enterprise has to pay 4% of what it extracts as royalties. In these titles, apart from the fact that they are illegitimate, coming from the Spanish crown, they own the soil and the subsoil, they’re perpetual, they only pay 0.04% instead of 4%. We calculated, that from 10 years, between 2005 and 2015, they [Mineros] owe the lower Cauca region a debt of COP 86 Billion in royalties because of this clause.’ (Respondent 11).

Legal devices such as the constitution are mediators that organize the mining sector, which in turn have been shaped by the lobbyists of extractive corporations. The bureaucratic and lobbying capacity of extractive corporations was translated into legislation by these companies’ attorney’s in the drafting of the 1991 constitution. In turn, the transformation of the constitution allowed these companies to maintain the tight territorial control established through colonial law, which they can then translate into financial profits. Central to this process are the legal documents that determine the details of the extractive economy: They are dynamic sets of rules that are designed not only *for* but also *by* actors in the extractive economy. In the case of Mineros S.A, these decisions affect an area almost the size of greater London, with thousands of inhabitants who thus do not enjoy basic rights to the property and the natural processes they need to sustain their subsistence lifestyles.

The above-cited respondent and others emphasized also the environmental debt of Mineros S.A, ironically pointing out that it had won a national environmental prize. A respondent who investigates the mining sector emphasized the inequality between external costs and internal profits that the company’s presence generates:

> ‘Why is [the town of] Nechí flooded so frequently? Because the wetlands served as protective barriers for floods. The wetlands provided fish, they provided communication between the small villages on the river banks. They [Mineros] destroyed means of communication, their well-being and environmental diversity, the fishing grounds, and all of this ended up in the pockets of Mineros S.A. through the rentability of gold mining.’ (Respondent 11)

Engineers working for Mineros employed the term ‘*limpiar*’ (Spanish: to clean) for the removal of the so-called ‘overburden’ before extraction can take place (Klein, 2014), that is the topsoil, vegetation such as fields or forests and buildings. An entire ecosystem is thereby dis-assembled, biomass thrown onto one pile, rocks on another, sand on another, until nothing is left but the mineral that is desired. When it has been removed, the former components of the ecosystem are re-assembled as a man-made landscape serving a commercial purpose, for example in acacia plantations. Surely, a mining executive would not refer to the bulldozing of his mansion and garden as an act of ‘cleaning’. The development discourse that legitimizes large-scale extraction in Colombia does not place value on natural actors and processes outside of the mineral market such as the streams that connect small villages (Shiva, 2010; Gómez-Baggethun, 2015). Mineros S.A reinforces the deep inequality of land

ownership that characterizes Colombia and induces permanent geo-physical changes to ecosystems, which are transformed from forests and fields to acacia and rubber plantations after having been mined, a prime example of how the substitution of unique natural capital by man-made capital is justified for 'sustainable development' (Daly, 2007). The material re-configuration of these natural actors that the interviewees experience jeopardizes the re-production of TEK and various subsistence activities, such as fishing or panning for gold.

The Hidroituango hydropower project on the other hand is an example of 'neo-extractivism', albeit in a neoliberal context (Gudynas, 2014). Neo-extractivism in Latin America is characterized by state-owned, gigantic extractive projects, usually justified as contributors to sustainable development goals (Gudynas, 2014). This specific project is owned by the state energy company EPM and was destined to provide seventeen percent of Colombia's electricity or 2400 MW, exporting overproduction to Central America (Corporación Jurídica Libertad, 2019). Hidroituango has been in emergency since April 2018, when landslides blocked the tunnels diverting the Cauca river. These diversion tunnels were supposed to release sediments from the reservoir back into the natural riverbed, prolonging the projects life-span while maintaining natural nutrient and sediment levels in the river (Hidroituango, 2016; Amat, 2019). For the first time in recorded human history, the Cauca river dried out completely in February 2019 due to complications in Hidroituango, while the accumulation of nutrients in the reservoir supports blooms of invasive plants that deplete oxygen and produce environmental toxins (Amat, 2019). The dam also prevents fish migration to spawning grounds upriver. At the same time, no more alluvial gold deposits will be transported further downstream than the dam, essentially putting an end to subsistence mining downriver (Amat, 2019). The project also establishes a permanent physical threat for the lower Cauca region, akin to a time-bomb with a random timer: A hitherto ignored assessment study after the landslides, co-authored by the US army corps of engineers, describes scenarios where '10 to 40 million square meters of earth' could fall into the reservoir, causing the dam to collapse (Jímenez, 2018). One respondent, a schoolteacher in a riverine community, explained how this affected life in his community:

> 'In the case of an earthquake [at the project site], we only have 6-7 hours to get out of here before the wave comes.' (Respondent 26)

The schoolteacher interviewed maintained, that the riverine communities had to organize their own crisis response, EPM had not assisted those affected by the emergency and subsequent economic crisis financially (the only road connecting the lower Cauca region with the interior was closed for months). Several hundred lawsuits are being filed against the company for economic damages. The Colombian attorney general is investigating EPM for the projects' environmental damage, and the agency responsible for issuing the projects' environmental license is sanctioning EPM for 15 violations of its

license, some of which cover incidents related to the emergency, and some which are related to non-compliance of construction with legal requirements (Amat, 2019; Mercado, 2019). One respondent, an officer working for a human rights program, commented on the states' complicity and the company's strategy of ignoring risk assessments:

> 'I think in the end they know what they're doing [at Hidroituango], but their economic interests prevail over those of the communities […] They've violated all kinds of community rights and there has not been an adequate legal response from the state and national government.' (Respondent 20)

Hidroituango is a state-sponsored (and part-owned) extractive actor-network that is part of Colombia's sustainable development or green growth strategy and violates the rights of indigenous and subsistence communities in the case region. Typically, ethnic communities in Colombia that are affected by infrastructure developments have the right to prior consultation, a right granted to them through the Colombian constitution and the ratification of the International Labor Organization Convention 169 (OXFAM, 2011). Respondents explained, that during the planning of the project, any alterations to ecosystems downriver of the dam were systematically ruled out, negating the riverine communities downstream the right to prior consultation and consent, since they were presented as unaffected. Although construction continues, the project has thus far not produced a single kilowatt of energy, it is unclear whether it will ever do so. The largest extractive-actor-network contributing to displacement and epistemicide in the lower Cauca Region has not even managed to commercialize what it is extracting. Before extractivism can be established physically, it must be presented as the single best way of associating to an assemblage of natural actors: The projects managers use their documentation of the case region to 'empty' it of significance (Cardona, Pinilla, & Gálvez, 2016). The hydropower potential of the Cauca river is deemed to be more important to achieving 'sustainable development' than to maintaining the subsistence lifestyles of the people in the Cauca canyon, including the last known Nutabe indigenous community, now displaced (Cardona, Pinilla, & Gálvez, 2016). The primacy of large-scale material transformation for 'green growth' establishes itself in the Cauca canyon by deliberately ignoring assets or natural actors that cannot be utilized industrially, such as the grains of gold panned by the inhabitants of the canyon, the fish in the river or fertile soil that is now flooded (Cardona, Pinilla, & Gálvez, 2016). The intention is to appropriate one natural process, hydropower, while ignoring the multitude of other natural actors and processes outside of the market that were traditionally part of ecological commons (Brownhill, Turner, & Kaara, 2012). Several of the power lines built to connect the project to the grid instead directly connect with mining operations in and near the lower Cauca region (Zuleta, 2018). One extractive actor-network thus enables another,

reinforcing the primacy of growth based on the large-scale conversion of ecosystems to resource deposits (Gellert & Lynch, 2003; Bridge, 2009).

Next to rivers, land, a vital part of any functioning ecological commons, is increasingly enclosed and put to use for private profit generation. Colombia is now the Latin American country with the greatest concentration of land, with a Gini index for the distribution of rural properties of nearly 0.9 for 2014 and a tendency to become yet more unequal (OXFAM, 2017). In the last decades, properties larger than 500 hectares, which represent 0.5% of all properties, have amassed nearly 70% of all rural properties in Colombia (OXFAM, 2017: 10). Respondents made the state and national elites responsible for this, since land titles are often created in dubious ways. A respondent who works in land restitution explained:

> 'Basically, they [land titles] are the manifestations of a judge who revised a testimony, never went to the property and said that the guy is the owner.' (Respondent 17)

Not only ownership of land, but also how it is used is highly unequal: 49% of the total land area or 415 719 hectares were destined for cattle ranches in the lower Cauca region in 2011 (UNPD, 2011). Cattle ranches are usually created by putting together smaller plots, either bought from willing sellers or forcibly acquired. In the process, ranches displace rural and indigenous communities and traditional agriculture, hardly creating substitution in the form of employment. A social leader from a subsistence community stressed that

> 'The cattle ranches that surround us are for the owners only, people from the village do not have access to work there […] they manage the farms centralized, with computers.' (Respondent 1)

Landowners are interested in only one or two use-values of land which are priced on markets. Land is adapted to an efficient economic exploitation, also through the use of high-tech (Ullrich, 2010; Romano, 2015; Gómez-Baggethun, 2015). Large landowners establish relations with natural entities such as water and land that are characterized by its over-exploitation (Gudynas, 2015). Ranching, along with mining, is the greatest threat to forests in the lower Cauca region according to an environmental engineer interviewed. Natural actors that are irrelevant or detrimental to this exploitation, for example wetlands, forests or local fauna are eradicated in the process. At the same time, land that is associated with power structures for rent generation is excluded from being part of indigenous and subsistence commons (Brownhill, Turner, & Kaara, 2012).

Criminal groups, especially their leaders, often buy up land to invest profits but also to expand coca cultivation areas (Villegas & Rebolledo, 2018). Extensive cattle ranching is not actively fostered

by the government as a prime contributor to development, but it is a legal activity and cattle ranches also belong to wealthy and influential businesspeople, including top politicians like Alvaro Uribe (COLPRENSA, 2017). Cocaine production on the other hand is illegal and persecuted with varying intensity by the state. The lower Cauca is one of three centers of cocaine production in Colombia and additionally a strategic corridor for transporting narcotics from the interior towards the Atlantic coast (Fundación Paz y Reconciliación, 2018). Coca used to be widely cultivated by indigenous peoples in South America for medical and spiritual purposes, especially in the Andean regions but also in the Zenú kingdoms (Céspedes & Niño, 2014). As one indigenous chief recalled:

> 'According to our ancestral knowledge, the Coca plant was not harmful, it was used for medicine […]. The white man studied it more intensively, he extracted another component [that indigenous people had no chemical access to]' (Respondent 21).

This component, cocaine, is now the sixth most widely used drug in the world and Colombia the largest supplier (UNODC, 2018). Not only the 18 million global consumers, also coca cultivation in Colombia is experiencing an all-time high, the latest census from 2017 estimated a record of 171 000 hectares of coca cultivation (UNODC, 2018). From this area the country can produce 1648 metric tons of cocaine (Ibid., 2018). In the lower Cauca, 15,627 hectares were used for coca cultivation last year, with an increasing tendency (Fundación Paz y Reconciliación, 2018). The Colombian government is a veteran of the war on drugs and has recently tried, rather unsuccessfully, to eradicate coca plantations by voluntary substitution (UNODC, 2018). Our respondents were not convinced that this approach was viable. One respondent who works for the institution that restitutes land, explained:

> 'Substitution does not offer the same kind of profit as coca cultivation. […] If you cultivate 5-10 hectares of coca, you can produce up to 20kg of paste, the kilo of which is worth 1.5 million pesos in the moment. You work 100 days for that. If you grow yucca for six months and you produce 100 sacks of yucca, you make 1 million perhaps, and then you still haven't paid for transport. There is no way you can substitute that.' (Respondent 17).

Cocaine is produced with quasi-industrial methods, liberating approximately 510 million liters of liquid chemicals and 98 560 metric tons of solid chemicals into sensitive environments each year in Colombia (UNODC; Gobierno de Colombia, 2017). While western societies continue to wage the 'war on drugs', they also continue to be the ones consuming these drugs (UNODC, 2018). The misuse of the coca plant can be interpreted as a form of epistemic extractivism, whereby traditionally indigenous practices and materials are taken from these contexts and adapted to the 'colonial Eurocentric modernist matrix', which induces an epistemicide of these traditional practices (Mignolo, 2011; Grosfoguel R., 2016), in

this case of coca as a medically and spiritually important plant for South American indigenous cultures. The coca plant has been transformed by chemists, drug users, politicians, law enforcement and criminal organizations from an indigenous natural medicine and stimulant into an illegal commodity, a 'luxury product' for western elites (Shiva, 2010). This enclosure of an epistemic-biological commons deprives indigenous communities of their ancestral practices and fosters the extinction of TEK for non-exploitative uses of the coca plant.

Cocaine production is still a major generator of income for armed groups, but is rapidly being replaced by illegal gold mining, which offers even higher profits in less time according to a Colombian state attorney (El Espectador, 2019). Illegal mining in Colombia refers to mining without having a mining title, environmental assessment or work plan, a requirement of the mining code from 2001. Since the vast majorities of mining titles are allocated to international companies that employ few workers, relying extensively on high-tech, miners feel that they have no choice but to extract illegally in other companies' titles or on public lands. Although illegal mining is perceived to be threat to national security and sustainable development by the government, local officials are often complicit. One indigenous representative from the case region estimated that there were around 1000 illegally introduced excavators digging away without permit there:

> 'You don't just put an excavator in your pocket and take it there, not in a suitcase either. Where do they go, where do they come from? How is it possible that this entered the region? […] They pay and pass [the police checkpoints] with the machines.' (Respondent 5).

The entrance of machines such as excavators or motor pumps for mechanized gold mining increases the rates of deforestation, material extraction and removal as well as contamination with sediments, fuel, cyanide or mercury in the case region (CORANTIOQUIA, 2005; García, et al., 2015). It was calculated that to extract one gram of gold, an illegal operation in Antioquia needs four workers and one excavator to remove 6 tons of soil, wash them with 1000l of water a second and add 10 grams of mercury for separation (Semana Sostenible, 2019). These operations only become profitable through international mineral prices, as a municipal secretary confided:

> 'In addition to the degradation of the environment and damage through mercury, what they call a *classificadora* is not very efficient. It only extracts about 50% of all the mineral, wasting roughly half. How is mining in this region sustained? Through international prices. Because the gold price and the dollar are so strong, if this weren't the case, these operations would not turn a profit, since they are so inefficient […]' (Respondent 9).

Illegal mining encloses, degrades and pollutes natural actors such as watersheds that are part of ecological commons: Paradoxically, after several decades of mining in a given area, the only way to earn a reasonable income is by working in the mines, as most other natural actors that subsistence communities depend on such as land or fishing grounds are degraded. A schoolteacher recalled the effects of mining on his village:

> 'The river was deeper [in the past]. Do you have any idea how many tons of earth the miners dump into the river each day? As a consequence, the water does not have anywhere to go in the wet season and floods the town, more each year. […] There is no more fish to fish, the mines destroyed that […]' (Respondent 26).

Image 4: Aerial View of the Nechí river system, irreversibly altered by legal and illegal mining.

60 to 65 thousand hectares are believed to have become infertile due to contamination by mining in the case region, and 75% of the Néchi river is severely contaminated (Caracol Radio Medellin, 2019). The World Health Organization's guidelines stipulate that the maximum intake of mercury should be 2 micrograms per kg of body weight per day. With an estimated 100 tons annually (García, et al., 2015), the amounts of mercury liberated in the case region in processes of gold amalgamation are thus high enough to poison the local population and fauna for millennia to come. Although it is conducted

outside of the reach of the state, illegal mining in the case region supplies a commodity to world markets whose origins are easily falsified. It is the same demand for gold that drives large-scale corporate extraction which also drives illegal extraction.

The development of diverse extractive actor networks in the case region is established through heterogeneous mediators ranging from colonial-era policies to high-tech centrifuges and heavy metals. On the legal side of extraction, high-tech and techno-science enable corporations to move huge quantities of material employing vast amounts of energy. The generally high prices that can be demanded on the world markets for extracted products such as gold or cocaine, on the other hand, also enable illegal extractive actor-networks that are established with rudimentary and inefficient production methods. The products that are extracted from the lower Cauca region are principally commercialized for what Shiva (2010) terms 'luxury consumption'. Neither gold, nor cocaine are important inputs for industrial production, the former is primarily used for jewelry and as a store of value for investors, while the latter is expensively sold to recreational consumers in industrial countries. Both gold and cocaine symbolize economic success and wealth. There is no demand for these products in the case-region, their extraction only becomes possible by establishing social ties between natural actors in the case-region, such as coca plants or grains of gold, and consumers in industrial countries that are prepared to pay high prices for luxury goods. The 'bads' produced in extractive and violent actor-networks in the case region are not felt by those who benefit from them such as Luis Carlos Sarmiento Angulo or those who consume the goods produced and who typically live far away (Brownhill, Turner, & Kaara, 2012): 'they have become more affluent through the privatization of nature's commons, and through their affluence they have been able to create protective barriers between themselves and an impoverished nature and impoverished peoples.' (Shiva, 2010: 236). State-supported extractive networks of the fourth generation are enabled through discourses of efficiency and sustainable development, while illegal networks are sustained through high prices, grievances of unemployed miners and the cooperation of small mining enterprises with criminal groups and corrupt officials (Korf, 2011; Gudynas, 2015, 2017; Burgis, 2016). Sustainability here refers to sustaining industrial activities and not natures regenerative capacities (Martinez-Alier, 2015). Natural actors such as land, minerals or rivers that are part of extrahective actor networks cannot be part of ecological commons simultaneously, inducing conflicts over their control (OXFAM, 2011; Brownhill, Turner, & Kaara, 2012). The Nechí river in the east of the lower Cauca region is almost entirely controlled by Mineros S.A, while the Cauca river is controlled by EPM. The majority of surface areas, mineral deposits or rivers in the lower Cauca region are now controlled and have been degraded or otherwise changed in their bio-physical composition by these corporations or illegal extractive operations (CORANTIOQUIA, 2005). This leaves precariously little intact 'nature' that can be part of ecological commons, as experienced by multiple interviewees. The power that a company like EPM wields over the Cauca river which runs through its floodgates necessarily extends also to those riverine

communities downriver that depend on the seasonal dynamics of such an important natural actor for their daily lives. When the river dried out, this deprived entire communities of their means of transportation, sustenance, income and recreation. The closure of the floodgates in Hidroituango in February 2019 is equivalent to shutting down the water and food supply as well as the transportation networks of a city of 130 000 inhabitants (Semana Sostenible, 2019). Extractive actor networks in the case region, whether illegal or state-sponsored, are characterized by a disregard to future generations' possibilities to establish reciprocal associations with their natural environment, which will have been transformed into a wasteland. As Naomi Klein puts it: 'Extractivism is a non-reciprocal, dominance-based relationship with the earth, one purely of taking.' (2014: 169). It operates through the objectification of natural as well as human actors who are little more than means of production which can be organized to generate profits (Ibid., 2014; Gudynas, 2015; Escobar, 2016). This conception of human-nature relationships is contested by indigenous and subsistence communities, not only in the case-region (Klein, 2014; UNDESA, 2019). The following section examines how the resistance to extractivism in the case region is broken violently.

4.3 Floating Fortresses, Armed Extraction: 'Small War' Networks in the lower Cauca region

Colombia harbors one of the longest ongoing civil wars on the planet. Without associations between armed groups and extractive operations, extraction would be impossible, as the region is a prime example of a non-sovereign territory where multiple armed factions fight for control (Korf, 2011; Collier, 2009). If corporations, the state or criminal networks attack ecological commons in a physical sense (Saed, 2012), it is through the mobilization of armed groups that they do so. This section proceeds first by examining the relations between corporate and illegal extractive operations on the one hand and paramilitary forces on the other, and then focusses on the methods employed by armed groups to enable extraction, typically targeted assassinations and forced displacement.

As respondents explained, the Colombian government prefers extraction to be conducted through large corporations, which are easier to control and tax than thousands of small mining enterprises. Large corporate extraction is seen as the key to 'sustainable resource development' in Colombia. According to multiple respondents with knowledge of the mining sector, the majority of mining titles in Colombia are allocated to large companies, leaving few areas for traditional and small miners, who proceed to exploit illegally, that is, without a title or environmental license. The allocation of so much territory to large corporations that extract with high-tech generates unemployment and grievances at the same time, an explosive mix which is exploited by armed groups participating in the 'small war', as a municipal secretary explained:

> ‘The multinationals already have all the plots of land where you can extract materials, they are monopolizing them, this generates a problem, an internal conflict here in the municipality and the region.’ (Respondent 9)

Large extractive corporations like Mineros S.A are actor-networks that enable an elite of people, who are usually far from sites of extraction, to gain an income from alluvial gold deposits that took Millenia to accumulate in the Nechí river floodplains. In terms of ecological economics, this is not ‘income’ but capital drawdown, since ‘income’ must by definition leave the productive capacity that sustains it intact (Daly, 2007: 104). This is currently not the case for any 3rd or 4th generation extractivist endeavor (Gudynas, 2015), and certainly not for the multinationals operating near the lower Cauca region. The productive capacity of the Cauca and Nechí rivers is thereby monopolized and even destroyed for the benefit of an elite, excluding both traditional miners and indigenous and subsistence communities from establishing associations to natural resources.

Traditional or subsistence mining and illegal mining is commonly portrayed as the same thing, further legitimizing large-scale industrial extraction, which is presented as more efficient and environmentally friendly. The mining code envisions for traditional miners to work as sub-contractors for large corporations, whereby the traditional miners would be entirely responsible for adhering to the environmental norms. Neither large corporations nor traditional miners agree to these forms of cooperation, according to our respondents. For traditional miners, negotiating with the large corporations, as a representative of a small miners’ association explained to us,

> ‘Is like a negotiation between a tiger and a donkey that’s tied to a tree, because they have the law in their favour. They have the titles, the economic, bureaucratic and administrative power, everything. And we are the illegals, the ones who contaminate, the ones who break and damage, we are scapegoats in any case.’ (Respondent 6)

The presence of illegal mining is convenient for large corporations, who can blame these miners for ensuing environmental damages or violence. In ‘small war’ networks, grievances by traditional miners are exploited by armed actors in practices of illegal gold mining, of which they obtain sizeable rents. One respondent who investigates the mining sector explained:

> ‘Paramilitaries fund themselves from their own mines as well as others that they extort. An extortion that also the police, military and other criminal groups have engaged in […] (Respondent 11)

Illegal gold mines are highly profitable for whoever 'owns' the mine, but they also consume vast tracts of land: By dismantling an illegal mine earlier this year in the lower Cauca region, investigators found that the paramilitary group 'Los Caparrapos' was extracting 20kg of gold a month, worth COP 2300 million, having damaged an area of 430 hectares (Semana Sostenible, 2019).

While illegal gold mines rely on protection through illegal armed groups ranging from paramilitaries to leftist guerrilla forces, corporations can rely largely on the governments' protection, as a scholar explained:

> 'They [Mineros] have their own army in their territory, the mining battalion N°5, which arose from a policy from 2012 that created these battalions to protect [extractive] companies.' (Respondent 11).

In a visit to Mineros' mining-barges, we observed and confirmed the presence of armed government soldiers and gun turrets installed on the barge itself, transforming it into a sort of floating-fortress-excavator (see photo).

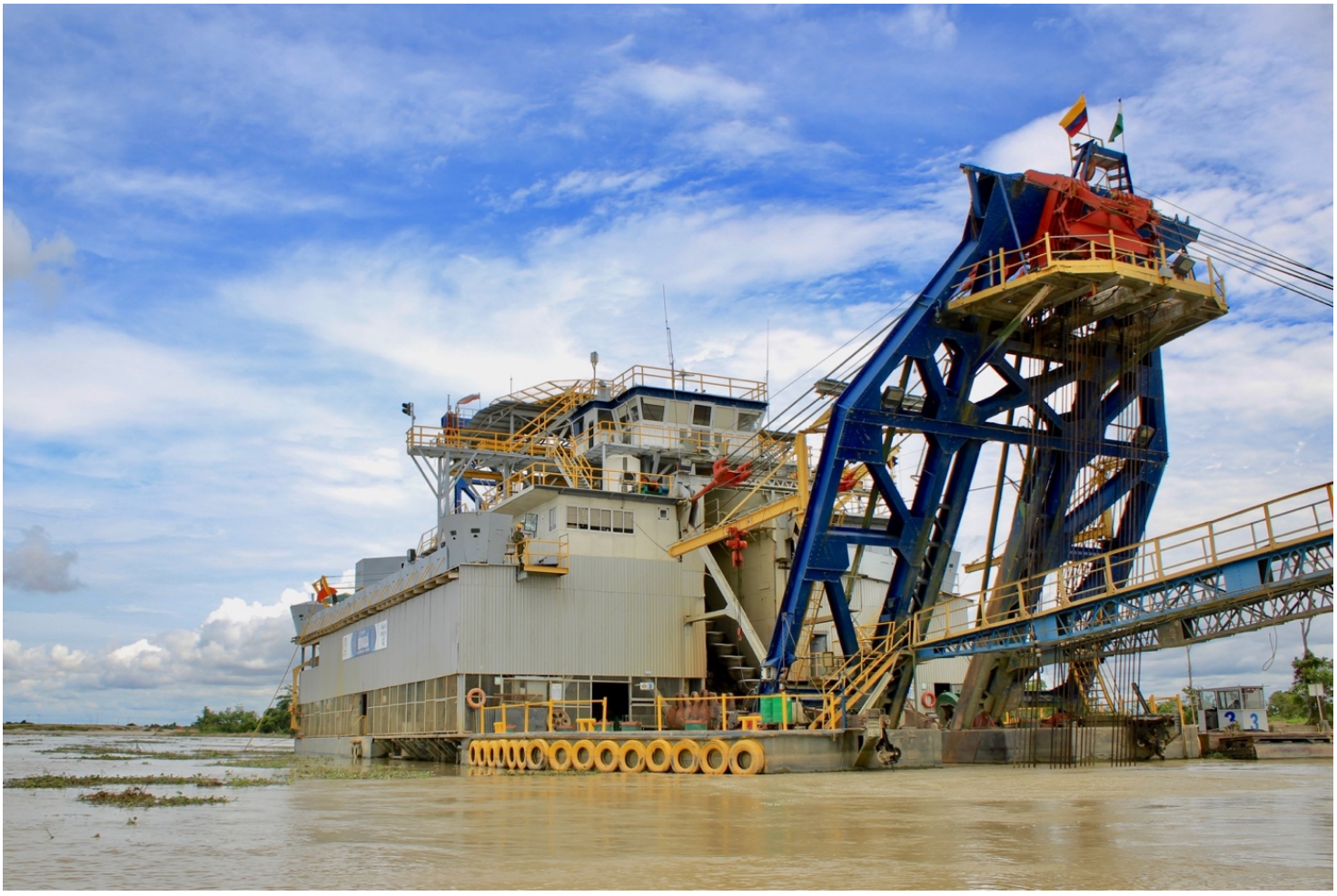

Image 5. Mineros' Floating Fortress with gun turrets, protected by government soldiers (front left corner of barge)

However, respondents also maintained that mining companies employ informal agents for dirty work, as a local social leader said he had experienced first-hand, having survived an assassination attempt by such a group:

> 'The whole world knows that Mineros S.A. has a clandestine group of assassins who kill the leaders that oppose their extraction in these territories.' (Respondent 6)

It is impossible to verify these specific claims. Accusations of targeted assassinations, which are supposedly ordered by corporations listed on European and North American stock markets, seem far-fetched. They are nothing new however: Eduardo Galeano (2015: 144) describes numerous massacres conducted in Latin America on behalf of multinational corporations in the early 20th century, also in Colombia in 1928. For the present era of neoliberal development policies in Colombia, investigations have revealed cases where multinational mining companies funded paramilitaries that displaced communities and assassinated social leaders (Reyes, Méndez, & Cruz, 2018). To my knowledge, no such investigation has focused on Mineros S.A thus far.

Hidroituango relied heavily on the Colombian military to 'pacify' and secure the projects influence zone (Zuleta, 2018). This state-owned extractive project is also accused of being associated with paramilitaries: sixty-two massacres occurred between 1982 and 2016 in municipalities affected by the Hidroituango project (Human Rights Everywhere, 2018), including a massacre committed against a Nutabe indigenous community in 1998 (Cardona, Pinilla, & Gálvez, 2016; Corporación Jurídica Libertad, 2019). In 2011, an attorney requested an investigation into allegations of cooperation between the Hidroituango project and a paramilitary force, her request was never fulfilled, and she was subsequently transferred to the Amazon (Cardona, Pinilla, & Gálvez, 2016). As with Mineros S.A, it is impossible to verify or endorse these claims without the results of an independent investigation.

The intimidation of social leaders and their targeted assassination is the tool of choice for achieving control over populations in the lower Cauca region and Columbia in general: 500 social leaders have been murdered since the FARC and the Santos Government agreed to a peace treaty in 2016 (Casey, 2019). Our respondents emphasized, that typically those leaders are targeted who speak out against extraction in or near their territories, or those who adopt voluntary coca substitution programs. An indigenous representative who survived several assassination attempts explained the implications of this violence:

> 'The leaders that can generate social fabric are assassinated. […] The majority of leaders who are killed are killed at the hands of narco-paramilitary groups. […] how is it possible, that one of the best military forces in the world, because Colombia has one of the most numerous, best prepared

and best qualified, is incapable of controlling criminal groups? There is complicity of the state in this type of thing, it's systematic.' (Respondent 5)

The murders lead to an exodus of social leaders from violent regions, severing the associations between them and their communities. This is especially tragic if these leaders are responsible for the re-production of knowledge or have a political function, for example as chiefs. While the state is officially opposed to all kinds of illegal armed groups, some are perceived to be greater threats than others, as a respondent with intimate knowledge of the Colombian conflict explained:

> 'The military always emphasized towards the politicians that public enemy number one was the FARC, a Cold War mentality. They also emphasized this towards their partners the drug traffickers as well as the *autodefensas* [paramilitary groups]' (Respondent 17)

The current strategy in 'small war' networks is thus to associate protest movements against extractivism with leftist guerrilla groups, legitimizing the assassination of social leaders through paramilitary units (Corporación Jurídica Libertad, 2019; Cohen, 2017). In May 2018, two members of a protest movement against Hidroituango named Rios Vivos were murdered in one week (Instituto de Estudios Políticos y Relaciones Internacionales, 2018). Assassinations are a cheap way to intimidate local populations and break resistance to the enclosure of ecological commons. The representative of small miners and peasants' organization explained this using the tragic example of a personal acquaintance who was supposedly killed for opposing large-scale gold mining:

> 'They [assassins] charge COP 50,000 per shot fired. […] An assassination can cost between COP 300 – 400,000 if they put 8 shots into him. For example, my comrade was shot seven times, that's 350,000 pesos [approximately 100€].' (Respondent 6)

In this instance, the 'sustainable development' doctrine enforces a utilitarian, economic approach not only to extraction, but also to breaking resistance to it. The cheapest way for extractive enterprises to accomplish this is by murdering social leaders, whereby the (alleged) presence of leftist guerrilla movements provides a source of legitimation for these assassinations as acts of war against enemy combatants.

Many of our respondents had experienced violence either first hand or been witness to prior massacres, as an indigenous representative explained:

> 'The first time I walked past a dead body was in the massacre of Puerto Bélgica [1997]. A massacre where they killed the municipal inspector, the secretary, the wife, they murdered

> the inspectors' father, the butcher who happened to open at 6 in the morning, nine people were killed that night.' (Respondent 5)

This statement pinpoints to the extraordinary disregard of human life and innocent bystanders that characterize resource conflicts (Burgis, 2016). There is a rationality behind such bloodbaths and it is to establish a state of terror, sending the message that anyone happening to be in the wrong place at the wrong time can become a victim. People in the case region told me, that in communities which are controlled by armed groups, people tend to stay indoors, avoid public spaces and mistrust one another, severely reducing the possibilities for interrelation, cooperation and resistance. Memories like the one our respondent shared remain present decades after the incidents' occurrence. Often, the perpetrators remain at large unidentified. Even when they are publicly known, they sometimes remain free for lack of evidence (Cohen, 2017). Armed groups do not only employ strategic violence to control territory before extraction, they also establish entire sets of rules for subjugated populations, the 'vernacular law' of small war networks. A schoolteacher from a small rural community explained:

> 'The region is permeated by criminal groups who make the rules. In fact, 20 days ago they organized a meeting here on the football field, where they presented their conditions. […] I was there in the meeting, because they go from house to house. They say it is obligatory for at least one man from every household to participate.' (Respondent 26)

Rules and death lists with the names of social leaders are also publicized on social media, in WhatsApp groups or printed pamphlets which are distributed in paramilitary controlled areas. Gangs impose curfews and 'fines' on populations under their control. Extortion by armed groups is one of the principal reasons why so few businesses flourish in the case-region, our respondents confided: Every shop that is located in paramilitary controlled territory, every truckload of fertilizer or machines that is transported through this territory is 'taxed', making most legitimate businesses unprofitable.

The fear installed in local populations by violent events and oppressive rules that our respondents experienced is enough to control them. A government official explained to us:

> 'Now, five men are enough to control a small village [*vereda*]. With five motorcycles, a cell-phone and a couple of hand-guns. They don't need machine guns, nor uniforms, they just have to keep talking about what they've been talking about for thirty years now.' (Respondent 17)

The continuous presence of armed groups effectively prevents resistance to extraction. This strategy does not require the imminent use of large-scale physical violence in massacres, which are not as

common now as they were in the last 3 decades. To remind people in controlled communities of previous brutal violence is often sufficient for organizing a state of terror.

The forced displacement of populations, i.e. the severing of associations between people and their land, is another tactic to enclose ecological commons and prepare territories for resource extraction. Colombia hosts the second largest number of internal refugees of any conflict worldwide, after Syria. Hidroituango's zone of affection is an extreme example: From 1990 to 2016, 106,027 people in the so-called 'projects influence zone' were forcibly displaced and 3,557 people were murdered (Calle, Rodríguez, Osorio, & Jimenez, 2018). During the premature filling of the reservoir, around 500 people were unexpectedly displaced from their homes in the Cauca canyon upriver of the dam and 9000 people fled Puerto Valdivia when a flood wave originating in the blocked tunnel destroyed the houses of 600 residents (Marcos, 2018). Allegedly, none of the evacuated have received compensation or assistance by EPM (Zuleta, 2018). The last Nutabe indigenous community in Orobajo was displaced by the reservoir, very likely leading to the extinction of this culture (David Higuita, 2018). An indigenous representative explained to us that

> 'To displace an indigenous person is not the same thing as to displace a non-indigenous person. Let's say in the case of an Emberá, an Emberá who does not speak Spanish, comes to Medellin as a displaced person, in what kind of situation will he get, if he does not know how to communicate, does not have money, […] his culture, everything is different, it's much harder. […] it's not the same with a peasant obviously, who has a minimum of knowledge [of urban Colombian life], who has relatives perhaps. (Respondent 5).

The forced displacement of an indigenous person induces a cultural shock, but also places the person in a setting of acute poverty. An indigenous persons' wealth derives from associations established with nature (Shiva, 2010: 238). An economy based on individual labor and financial exchange is as alien to an Emberá as skinning a caiman is to the average inhabitant of Medellin.

'Small war' networks in the case region are thus established through a large variety of heterogeneous materials and concepts. Social media communication tools, paired with painful memories of atrocities, are just as important to armed groups seeking to displace a subsistence community as actual weapons. Targeted assassinations, priced like any other service available in a free market, are another tactic to remove specific critics of extractive activities violently. Mining titles represent the possibility to establish a legal association with a resource, and only a few actors, mainly large corporations, have access to this crucial mediator, while traditional and medium sized mining enterprises can either close down or face persecution as illegal miners. This is where armed groups step in, guaranteeing security and access to resources in the absence of the state and its regulatory functions, which are lavished instead upon large corporations. Extraction in non-sovereign territories

is typically impossible without security guarantees (Esteva, 2014). For large corporations in the case region, these guarantees come to a large part from the government itself. While this cannot be proven for corporations such as Mineros S.A or EPM (Cardona, Pinilla, & Gálvez, 2016), the numerous illegal mining and cocaine-producing operations rely extensively on paramilitary troops and hired assassins to deliver targeted violence to resistant populations, showcasing the diversification of armed service providers to extractive enterprises. Whether delivered through government agencies or paramilitary units, violence is still central to the enclosure of commons, not only historically (Shiva, 2010; Esteva, 2014). 'Small war' networks thereby enable material extraction for growth and luxury consumption (Shiva, 2010; Korf, 2011; Gudynas, 2015). Growth in commodity extraction and trade may lead to more global interconnection as the founding fathers of the modern global economy predicted (Sachs, 2010), but at the same time they install violent structures in regions that are predominantly extractivist (Galeano, 2015; Burgis, 2016). Economic interconnection based on resource extraction and transformation may promote peace between sovereign and strong states (Sachs, 2010) but increases violence in non-sovereign territories, especially against indigenous and subsistence commons (Weston & Bollier, 2013; Gudynas, 2015). The oppression and forced displacement of people paves the way for the conversion of ecological commons into 'natural resources' and their ensuing extraction (Esteva, 2014). The forced displacement of indigenous populations thereby weighs especially heavily on the reproduction of TEK in ecological commons and is therefore a direct contributor to the de-legitimation and loss of ecological ways of knowing.

4.4 Epistemicide: the de-legitimation of ecological ways of knowing

The enclosure of ecological commons is enabled by the conversion of nature into resources and their extraction for material growth by the state and the market while TEK, and the ecological commons it circulates in, are de-legitimized (Sachs, 2010; Mignolo; 2011; Esteva, 2014). The primacy of this approach is established mainly through the devaluation of subsistence lifestyles, which are presented as 'underdeveloped' (Sachs, 2010; Esteva, 2014): People in ecological commons do not extract the full potential of the natural capital around them, hence, their economies are inefficient and unsustainable from a perspective of green growth (Daly, 2007; Shiva, 2010). This section examines how ecological commons are devalued, while large scale corporate extraction is fostered actively by the state and illegal extraction is a by-product of failed extractive policies and free market dynamics.

The valuation of natural actors such as gold on markets can already induce changes in the way that this actor is deployed in ecological commons. In ecological commons, natural actors only have a subsistence or spiritual value, value beyond direct uses are uncommon and tend to distort traditional uses of materials (Shiva, 2010). A Zenú chief emphasized that:

> ‘Gold did not have value for us. The Zenú did not live from gold, they lived from plants, from their harvests […] Today a Zenú trades gold for other things he needs, because the Spaniards and others placed value on it.’ (Respondent 21).

The associations that the Zenú established with gold were not established for commercial purposes in pre-Hispanic times but for ornamental and spiritual reasons. The methods of extraction employed were not able to deplete the flow of minerals that were washed out of the mountains, making it principally a re-generative activity and sustainable in the ‘deep’ sense of the term (Daly, 2007). A process is sustainable, according to this definition, if it can continue infinitely without depleting the productive capacity, i.e. natural capital, that it depends upon to re-generate itself (Daly, 2007). Obviously, large-scale alluvial gold mining does not heed to this approach, resting instead on assumptions of weak sustainability, i.e. the possibility of replacing natural with man-made capital and services (Daly, 2007). Nowadays only those aspects of Zenú gold-culture remain that can be adapted to produce for luxury consumption, that is, for material economic growth, while indigenous knowledge of gold-processing for spiritual and artistic purposes has been lost forever, an example of ‘epistemic extractivism’ (Grosfoguel, 2016).

In the lower Cauca region, legal instruments such as the mining code are critical mediators in establishing the primacy of sustainable development through extractive networks (Andrade-Sastoque & Jímenez, 2016). A scholar with intricate knowledge of the mining code explained to us:

> ‘It [the code] places obstacles to the acquisition of a mining title in a way that only large and not small mining enterprises can access a title. […] The discourse that they [The Uribe and Santos governments] brought forward was that the mining sector attracts foreign investment and creates royalties, and that royalties serve for social investments. This is a development approach understood as economic growth.’ (Respondent 11)

According to the respondent cited above, 86% of the titles that small and medium mining enterprises had solicited were not allocated to them. Policies for managing resources, such as the mining code, do not distinguish between activities conducted for capital allocation and those taking place in subsistence commons. A representative of a small miners and peasants organization informed us:

> ‘The [mining] code should differentiate between the different motivations for mining. Because some do it for their subsistence, while the other is something totally extractive. For example, in my little mine, I extract some gold, with this gold I can buy goods for 15 days. When they are empty I go to my mine again. That’s a subsistence mine.’ (Respondent 6)

The mining code organizes sustainable development through large-scale extraction. At the same time, it ensures the de-legitimation of indigenous and subsistence practices such as traditional mining which are impossible to realize under the conditions the policy prescribes, the representative of traditional miners continued:

> 'Traditional mining is destined to disappear. Why? Because the mining code stipulates that traditional mining may take place no more than 200 m from the river banks [outside of an official mining title], using only a shovel, a pickaxe and a pan.' (Respondent 6)'

More than 60% of Antioquia's areas are already carved up into mining titles and around 80% are solicited according to a respondent working in an environmental agency. Subsistence activities have nowhere to go. The mining code is a policy for managing resources that contributes to this unequal allocation of possible associations between people and land. It empties nature of its spiritual significance and makes TEK redundant. Resource management for sustainable development, accordingly, can be perceived as a strategy for enclosing ecological commons, including those that revolve around traditional mining in the case region.

The Colombian governments' restrictive approach to resource management in the lower Cauca region denies that indigenous and subsistence communities can be knowledgeable, effective custodians of nature. A somewhat perplexed Zenú chief explained the situation his community was in:

> 'We came from San Andres de Sotavento [Zenú Reservation] because we had no opportunities there, there was no more land to cultivate. We came to these empty lands of the nation, only to discover that we were in a forest reservation *and* a mining title. So, the question is, whom is the state benefiting, the communities or the corporations? […] Because of the forest reserve we cannot establish an indigenous reservation here, but a company can mine here.' (Respondent 27)

Techno-scientific discourses legitimize the large-scale transformation of natural capital in mega-projects and 'fortress conservation' approaches that see conservation as incompatible with indigenous and subsistence lifestyles (Tauli-Corpuz, Alcorn, & Molnar, 2018). The lessons that growth societies draw from their own irresponsible exploitation of nature is that to conserve nature is to deny people access to it. 'Fortress conservation' thus displays an ignorance of reciprocal ways of engagement with nature that have been practiced for Millenia by countless indigenous peoples (Huaman, 2015; Tauli-Corpuz, Alcorn, & Molnar, 2018). Ecological commons and corresponding ecological ways of knowing that precede the arrival of extractivism are thereby disregarded as outdated knowledges (Shiva, 2010).

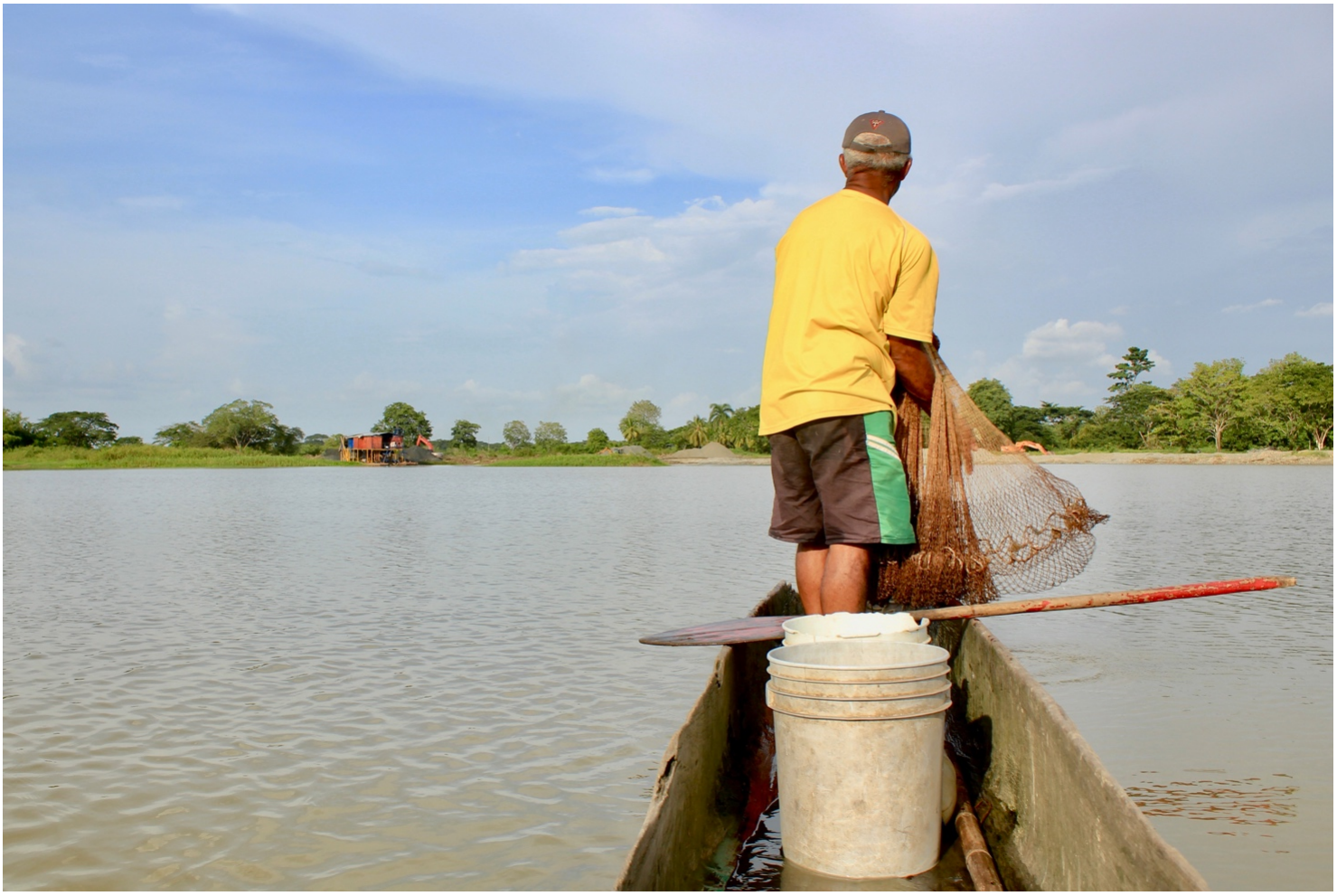

Image 6. This lake provides income to a community of Afro-Colombian fishermen, while it is simultaneously being mined for gold. Both uses are not compatible in the long term.

The conflict between empirical ecological knowledge and techno-science was explained by an indigenous representative using the example of Hidroituango, where, according to him, engineers did not attend to the observations of local residents that the mountains where the project is constructed tend to be unstable, porous and prone to landslides:

> 'They did not listen to the people who lived for 500 years in that canyon panning for gold, observing the mountains. What's happening now? That's what happens when technology does not enter into a dialogue with traditional, ancestral territorial knowledges. […] Science and technology are at the service of an extractivist economic model. […] That's why they could implement Hidroituango, because science said it was possible […] (Respondent 5)

The supply chains organized for the sake of materializing economic growth are much longer, more energy- and waste intensive, and generate much less 'employment' than the supply chains that indigenous and subsistence communities already had in place in their territories. These long supply chains, of which mega-projects but also illegal mines are crucial components, are extremely complex,

risks that arise through the failure of specific components cannot be assessed properly, as is evident in the ongoing emergency in Hidroituango. Mega-projects are employed by policy makers for realizing their policy objectives such as sustainable development goals and to foster legitimation for governing coalitions in urban areas, which are unaffected by the negative consequences of these projects (Gellert & Lynch; 2003; Shiva, 2010). Extractive public development projects such as Hidroituango are also used to generate kickbacks for corrupt politicians (Gellert & Lynch, 2003; Gudynas, 2017), who use these funds to deepen their grip on power according to our respondents.

In this context of categorical exclusion from decision-making, indigenous and subsistence communities have a hard time making their case for ecological commons and associated cultures of knowing. A respondent working in a municipal administration confided to us that his municipality possesses 2,000 hectares from a restitution fund from the Colombian peace process, which the administration intends to convert into pineapple plantations. According to this respondent, fruit plantations create much more employment than cattle farms. At the same time, many landless indigenous communities in the case-region have been insisting for decades on their constitutional right to self-administered territories. Two indigenous town hall representatives mentioned to us that they had asked for land for displaced communities, unsuccessfully:

> 'We are crazy for land here, land that used to belong to the mafias, now it is in the hands of the town hall. […] The mayor won't give us two or three hundred hectares, land that the municipality has, so that we could go after our [indigenous] customs there.' (Respondent 14).

Land management in the case-region thus aligns with the quest to materialize growth, whereby plantation monocultures and large multinational corporations are seen as the most efficient vehicles in appropriating natural capital and transforming it in the quest to foster 'green growth'. 2000 hectares is a vast expanse of land, it could be used for multiple purposes, for plantations that provide employment for urban populations as well as land for the (re-) establishment of ecological commons. A Zenú town-hall representative maintained that for indigenous peoples, land is critical for survival, not for gaining monetary income:

> '[…] We do not believe in having 20-30 *fincas* for raising and selling cattle. [Land] is for our own consumption, to sustain our families.' (Respondent 25)

A community of a hundred Zenú or Emberá can live quite well off two to three hundred hectares as our respondents explained and demonstrated in various communities that were visited, showcasing the small ecological footprints of indigenous and subsistence communities in the case-region. These communities do not live in complete isolation of course and make use of modern tools in addition to

traditional techniques. However, the vast majority of calories and materials that are consumed by communities living in ecological commons are produced on and from their territories (Weston & Bollier, 2013), without the loss of biological productive capacity that characterizes ecosystems in industrialized settings (Daly, 2007; Rockström, et al., 2009; Díaz, Settele, & Brondízio, 2019).

Policy-wise, the implementation of sustainable development prioritizes corporate development and material-intensive supply chains over the direct appropriation of nature through communities in ecological commons, as an environmental engineer explained to us:

> 'Since mining is categorized as an activity of public interest, a [legal] mining project is simply implemented. You don't agree? Expropriation, you go, bye-bye. What does this generate? Displacement, abandonment of land, violent cultural changes in these communities.' (Respondent 7)

Indigenous and subsistence communities are excluded from lands that are preferably transformed into commodities and exported for the benefit of elites that control these operations (Gómez-Baggethun, 2015). This forces indigenous and subsistence communities to live in precarious circumstances, awaiting displacement. Once displacement has occurred, formerly rural people must forcibly acquaint themselves with western consumer culture in cities. In these circumstances of displacement and alienation, traditional ecological knowledge is irrelevant and quickly forgotten.

Indigenous respondents emphasized that the loss of access to 'territory' is typically understood to be the severest threat to the survival of their lifestyles and TEK. The loss of territories amounts to the violent disruption of associations between people on the one hand and specific natural actors and processes on the other. As an indigenous representative explained:

> 'The principle element affecting indigenous peoples is territorial uprooting. When they take you, [it changes] your relations with earth, you lose a lot of your personality, of your indigenous spirit. […] Without territory our knowledge is lost, what is the foundation of our education without pedagogical elements? The pedagogical element of indigenous education is mother earth […] How does a tree grow on pavement?' (Respondent 5)

To privatize something for someone is to deprive someone else of it (Shiva, 2010). By privatizing access to nature in the quest for growth, extractive power structures deprive indigenous and subsistence communities of establishing social relations with this nature, relations that are conveyed through TEK. In the past, epistemicides went hand in hand with genocides. Although genocides are still a feature of the 21st century, the enclosure of ecological commons for extraction and the displacement of ecological ways of knowing may become the leading causes of epistemicides. The lower Cauca region

exemplifies this process. The severing of social ties supporting ecological knowledges by extractive projects and violent displacement in the lower Cauca region, and elsewhere in Latin America, amount to epistemicides (Sousa Santos, 2016): TEK that was adapted for life in a rainforest has no use to communities in a city or a man-made desert. On the other hand, mined sites can eventually be recovered, even a hydropower project can be built back. However, by 'deleting' ecological knowledges little by little in epistemicides, modernist paradigms of material economic growth, such as the contemporary green growth doctrine in Colombia, slam a door shut that would permit us to resume a path of reciprocal human-nature relations in the Anthropocene.

Chapter 5: Conclusion

This study sought to emphasize the precariousness of traditional ecological knowledges that are situated in non-sovereign territories characterized by extractive economies. It thereby contributes to enhancing our understanding of how contemporary 'sustainable development', green growth and rampant extractivism impact future generations possibilities regarding ecologically sustainable lifestyles using TEK. The study enhances the scientific literature regarding epistemicides, by drawing on insights developed by Latin American critical theory, Science and Technology Studies and Political Ecology, among others (Latour, 2005; Daly, 2007; Law, 2007; Mignolo, 2011; Galeano, 2015; Gudynas, 2015). The academic value of this study emerges from its unusual data set and approach to data analysis, which enabled deep insights into how these diverse actor-networks are organized. The dominance of extractive projects in the case region and the violent enclosure of commonly accessible nature caught the researcher's attention and informed the 'emerging' (Suter, 2012) investigation into the contemporary organization of epistemicides (de Sousa Santos, 2016). The analysis of data gathered in the case region provides exclusive insights into the enclosure of commons in the early 21st century, typically for sustainable development or illicit extraction in weak states where governance structures such as resource policies or the military can be coopted for serving the interests of extractivist elites (Shiva, 2010; Sachs, 2010; Saed, 2012; Galeano, 2015). The application of tools burrowed from the Actor-Network-Theory thereby opened the analysis to non-human actors such as the Cauca river, the coca plant or other materials, technologies and legal concepts, which would otherwise be excluded from this 'reassembly of the social' in all its aspects (Latour, 2005). This study thus engages with the data as distinct but overlapping actor-networks (Law, 1992, 2007). In these networks, human and non-human actors (knowledges and technologies among them) are ordered to convey effects (Law, 2007). In ecological commons, this effect is sustenance, while extractive networks align with 'small war' networks to commodify nature, typically for individual profits. The 'agency' of non-human actors is central to the success or failure of specific networks (Latour, 2005; Law, 2007): Three landslides changed the trajectory of the Hidroituango hydropower project forever, along with its adverse effects on ecological commons. Social media networks and cellphones can connect traditional healers just as well as they can be used to convey fear and establish rules for subjugated populations. Mediators such as laws shape human behavior and relations with natural actors such as minerals or rivers, while corporations whose power stems from the ownership and exploitation of natural actors actively shape laws to their likings. These non-human actors are not passive, they make people act, inducing behavioral changes, especially in associations with natural actors, which are increasingly subjected to the meta-physics of the 'one-world' (Sachs, 2010; Law, 2011).

In a definition following ANT's conceptualization of the 'social' (Latour, 2005), epistemicide is the severing of heterogeneous social ties that support knowledge reproduction. Armed with this

insight, the study first focused on 'nodes' where heterogeneous social ties in ecological commons are established. Later, these findings were contrasted with appropriation of nature in diverse extractive networks, which are defined by rapid disruptions of associations in ecological commons and ecosystems alike (Gudynas, 2014). Armed actors in 'small war' networks thereby combine political grievances with the urge to generate rents, allying themselves with actors engaged in resource extraction (Korf, 2011). When extractive and violent networks enclose ecological commons, they de-legitimate ecological ways of knowing and make their continued application impossible, since natural actors that are critical to the functioning of ecological commons are then appropriated and / or degraded through extractive activities.

The research question asked for deep descriptions of this enclosure of ecological commons in the case-region: *How do extractive and violent actor-networks contribute to the 'epistemicide' of TEK by enclosing ecological commons in the lower Cauca region?* The analysis of the rather large amount of data established numerous relevant findings, related to the functioning and overlapping of the actor-networks retraced in the data. Defining ecological commons in the case region as 'assemblages' (Watson-Verran & Turnbull, 1995) where peasants or indigenous peoples such as the Emberá or the Zenú form reciprocal relationships to natural actors and processes, highlights the primacy of these natural actors in the functioning of these governance systems. The findings of the analysis confirm, that the displacement; of people, species and materials; is an inherent feature not only of mega-projects (Gellert & Lynch, 2003) but of all types of extractive activities. Displacement by extractivism and resource wars is not only material however (Ibid., 2003; Gudynas, 2014), it is also epistemic, displacing practices based on ecological knowledge and, if at all, introducing extractive knowledge, such as is employed in Hidroituango or an illegal mining site. These knowledges treat nature as a static repository of resources (Shiva, 2010). Similar to epistemic or ontological extractivism, terms coined by Grosfoguel R. (2016), this process could be termed 'epistemic displacement'.

Since colonial times and especially the Industrial Revolution with its dependence on the extraction and reconfiguration of 'nature' (Shiva, 2010), the power structures that maintain material growth are principally extrahective, i.e. violent. Applying ANT to describe how violence affects TEK reveals the vulnerability of heterogeneous social relations in ecological commons to violence. Since the lower Cauca region is highly contested by armed groups, extraction is only possible through alliances between actors in extractive networks and those in networks of 'small war' (Korf, 2011; Malamud, 2018). In such a hostile environment, legal ownership of resources alone is not enough to enable their extraction. Extractive projects are only successful if they establish control not only over resources but also over local populations and *their* practices of engaging with resources. Typically, this involves physical and psychological violence directed towards local populations, who are frequently drawn into the conflict involuntarily. Grievances exploited by armed groups are created in this region also through government policies: Policies like the mining code govern the establishment of

relationships between people and natural resources. They exclude a vast number of people from establishing reciprocal relations with nature that is ignored by markets, while enabling an elite to establish extractivist relations with the few resources that are priced on markets. Armed groups thus have a steady supply of unemployed laborers to man their illicit gold-mines, miners who are prevented by the mining code of legally establishing a social relation with their territory through traditional mining practices, or peasants displaced from their lands through drug cartels.

The findings demonstrate how ecological commons in the case region are enclosed militantly pending a strategy of de-legitimation by the state and the market, which employ a discourse drawing heavily on techno-scientific arguments (Saed, 2012; Esteva, 2014). 'Sustainable development' projects established through large corporations are prioritized through these power structures, to the detriment of ecological commons (Weston & Bollier, 2013). Actors behind extractive projects 'empty' regions where extraction shall take place of their significance for local populations (Cardona, Pinilla, & Gálvez, 2016): Indigenous and subsistence lifestyles are pictures as un-developed and their knowledges are made redundant by the prevalence of high-tech and techno-science in 'sustainable development' projects like Hidroituango (Shiva, 2010). Sustainable development and 'fortress conservation' (Tauli-Corpuz, Alcorn, & Molnar, 2018) of natural actors go hand in hand, symbolized in the Serrania San Lucas mountain range, where Zenú communities have waited decades to obtain land permits while multinationals can mine freely in this forest reservation. Our respondents' observations, interpreted in the analysis, also emphasize that green growth and fortress conservation are highly ineffective in reaching their own goals, because they do not question the meta-physics that give rise to the problems they confront in the first place (Daly, 2007; Mignolo, 2011; Tauli-Corpuz, Alcorn, & Molnar, 2018). In contrast, indigenous communities in the case region demonstrate that they can conserve nature and live sustainably at the same time, while the Colombian state struggles to control illegal extraction in forest reserves.

These findings indicate that the prioritization of the (frequently violent) development of natural actors for materializing economic growth is presumably the leading cause behind the enclosure of ecological commons in the 21st century, as is exemplified in this case study of the lower Cauca region (Berthoud, 2010; Brownhill, Turner, & Kaara, 2012). The epistemicide of ecological knowledge thereby constitutes a challenge for public administrations: The ecological crisis demands deep transformations of lifestyles in growth societies, which rely extensively on the conversion of nature into commodities (Klein, 2014). Extractivism and 'small wars' in territories also inhabited by peasants and indigenous peoples destroy precisely those lifestyles that are compatible with the planets ecological carrying capacity, while they cater to populations leading lifestyles which are detrimental to current and especially future ecological carrying capacity (Shiva, 2010; Díaz, Settele, & Brondízio, 2019). Worse still, those communities living in ecological commons that are uprooted through this process have no choice but to become part of the 'one-world' and its material intensive consumer lifestyle, thereby

contributing to the overconsumption of ecological goods and services that characterize the 'one-world' (Daly, 2007; Sachs, 2010; Klein, 2014). Every peasant that manages a 'successful' transition from a subsistence lifestyle to the average lifestyle of a US-American increases humanity's material use by several dozen tons (Bridge, 2009; UNEP, 2016). About a third of the world's population still depends on functioning ecological commons and TEK, living in indigenous or peasant communities with small material footprints per capita (Weston & Bollier, 2013). This represents a gigantic opportunity in a moment of crisis: For public administrations, the preservation of ecological ways of knowing and the ecological commons where these knowledges and practices are applied could have a significant impact on humanities' chances to halt the increase of our ecological footprint and find ways to lower it permanently (Klein, 2014). Non-indigenous societies could thereby learn from indigenous peoples and their practices: In a time when many governments are contemplating bans on plastic wrapping, Zenú practices such as wrapping food in leaves may become interesting for application also in industrial societies. Agro-ecological methods of producing food are also gaining prominence, due to their compatibility with soil health and high productivity (Klein, 2014). Many of these methods were pioneered by indigenous peoples, who have been experimenting with unique agricultural techniques for Millenia, also in the lower Cauca region. Current calls to revive the Zenú canals, among others, show that contemporary growth-based societies consider the employment of TEK and adaptive practices to re-engage reciprocally with nature (Céspedes Melo & Niño Muñoz, 2014). However, the employment of ecological knowledge, as this investigation shows, implies the enactment of an indigenous understanding of nature, in which rivers are not defined as natural resources that serve purposes of materializing growth. While ecological commons can indeed serve as models of human-nature interaction for sustenance outside the realm of state and market, they are in danger of becoming extinct, as this study sought to emphasize. The lower Cauca region may now be an extreme example of extrahection, but perhaps this will be the standard mode of operation for many extractive enterprises in the future, as is already demonstrated in numerous weak states from Colombia to the Democratic Republic of the Congo (Collier, 2009; Korf, 2011; Burgis, 2016).

This research, like any research, has its limitations. Long travel times and precarious routes to rural and indigenous communities as well as sites of resource extraction limited the time that could be spent on interviews and participant observation. It was generally deemed to be unsafe in rural regions or on the road in the darkness or without a local escort. The researchers' role as a foreigner and the large material inequalities sometimes present notably influenced the relations with respondents and research participants: In one occasion, a respondent subtly attempted to extort the researcher. The focus on deep descriptions of processes in the case region by respondents who are also part of these processes is highly subjective and cannot serve to construct assumptions of truth or falsehood, instead reassembling the subjective experiences of our respondents, for example when they faced displacement or violence. Abstaining from investigating the truth or falsehood of statements by

respondents limits the extent to which the study can claim to produce generalized insights. Another limitation regards the representation of actors from extractive operations. Although sites of extraction were visited, and meetings held with representatives of the mining sector, no formal interviews were conducted with these representatives. This means that the statements from respondents disproportionately represent the victims of these operations, giving the alleged perpetrators no room to describe the functioning of their worlds in their own terms. Furthermore, the study drew on a very small portion of the data that was gathered, which covered many more topics than resource extraction. For example, the study could have also included a reflection on the role of the rubber sector in the lower Cauca region, an alternative economy that is ecologically much more sustainable than mining and is managed through peasant cooperatives. Alternative research questions in this regard could ask whether subsistence economies that incorporate the production of a 'cash crops' such as rubber offer more viable alternatives to extractive economies than traditional subsistence economies in the case region.

Future research regarding ecological commons and ecological knowledge can develop in several dimensions. On the one hand, there is a great demand to find low-tech solutions to ecological problems with innovative crop irrigation, agro-ecological food production and alternative natural materials, among others (Klein, 2014). Research that focusses on how to adopt indigenous solutions to ecological problems is one of these dimensions, whereby great care must be excised not to travel the path of 'epistemic extractivism' (Grosfoguel, 2016). Indigenous peoples worldwide, despite their intricate knowledge of traditional medicine, still face greater insecurity in health and often have a decreased life expectancy in comparison to non-indigenous populations (Cotes-Cantillo, et al., 2016). Another research dimension could focus on how indigenous societies can establish zero-growth economies that manage to fulfill not only their material needs but also sustain intercultural health and education systems that decrease existing inequalities. Yet another dimension of research could develop a model that quantifies the per capita resource use in the ecological commons of a given country and compares it to that of the average urban inhabitant of that country. This would illustrate the ecological debt owed to indigenous and subsistence communities, who have had no role in the industrial exploitation of nature in the Anthropocene but are the first to suffer its consequences through pollution, climate change, conflicts and displacement (Klein, 2014; Gudynas, 2014). Yet another dimension of research could describe how ecological commons function in terms of ecological economics, whether the 'income' generated in them is truly sustainable and represents an alternative to the 'capital drawdown' that characterizes green growth (Daly, 2007).

There is a rising interest in issues of commoning and ecological knowledge (Esteva, 2014), which is surely connected to the sense of threat emanating from the ecological crisis and the search for solutions that suppress the impulse to master nature: 'Like seed savers safeguarding the biodiversity of the global seed stock, other ways of relating to the natural world and one another have

been safeguarded by many indigenous cultures, based partly on a belief that a time will come when these intellectual seeds will be needed and the ground for them will become fertile once again.' (Klein, 2014: 443). Reflecting on the findings of this investigation in regard to the findings of other authors, this study maintains that this time is now. In the lower Cauca region, indigenous communities and peasants are desperately looking for land where they can sow not only their crops but also their practices and ways of engaging with one another in peace. When people are alienated from ecological commons, as happened to many of our respondents, TEK is inevitably lost (Brownhill, Turner, & Kaara, 2012). For many people of the lower Cauca region living in ecological commons, 'degrowth', i.e. the recommended downscaling of production and consumption in western societies (Latouche, 2004; Díaz, Settele, & Brondízio, 2019), may be 'much too little too late' (Brownhill, Turner, & Kaara, 2012). It seems, as if extractive power structures have forced the lower Cauca region into trajectories of 'business as usual' and technological 'ecomodernism' in response to the challenges of the Anthropocene (Wright, Nyberg, Rickards, & Freund, 2018). In a nutshell, this means that extractivism remains unchallenged while extractive projects become more technology intensive and assume gigantic proportions, appropriating even the last 'undeveloped' hectare of land in the lower Cauca region. Most ecological commons, and corresponding ecological knowledges, are in the process of being irreversibly destroyed by these developments and may not survive the current century (UNDESA, United Nations - Indigenous Peoples, 2019). This is no inevitable destiny however, as this study seeks to emphasize, it is a material process that involves the transformation of assemblages of natural actors. It is possible to pinpoint the exact people, policies and technologies that are part of this tragic performance of power exertion. Hence, the process of how power is exercised in extractive and violent networks can not only be made visible and understood, it can also be changed, through a re-ordering of these actors.

Policy proposals based on the findings of this research should place their emphasis on implementing the rural transformation promised in the Colombian peace accords, most importantly the restitution of land. Safeguarding the possibility for indigenous people and peasants to establish legally protected associations to land, whether individually or collectively, is probably the single most effective way for administrations to prevent the loss of ecological knowledge. This should be closely followed by strict enforcement of environmental law in general, for example ensuring water quality standards or prohibiting high-risk extraction near communities or altogether. Restituting territory and control over natural resources to indigenous and peasant communities serves numerous purposes simultaneously: By engaging communities in nature conservation and the revitalization of degraded territories, society in general but especially local communities invest in their own future, create employment and choke off the flow of unemployed youths to be deployed as 'cannon fodder' in armed conflicts or as laborers in extractive operations. To establish functioning ecological commons fosters cooperative relations among community members and reciprocal relations with the environment.

Their members use less materials and emit less emissions per capita than industrial societies, showcasing that these are not only effective development models of the distant past but also of the near future. This insight is slowly starting to gain ground world-wide (Klein, 2014). In organizing a 'Minga' in 2018, the indigenous peoples of the case region reminded their government of this and demonstrated that they are prepared and intent to demand the fulfilment of promises that have repeatedly been made regarding the establishment of autonomous indigenous territories in Colombia. For those communities that do not have land rights or that are threatened by armed groups or corporations in their territories, this type of bottom-up civil resistance is the most viable way to pressure the responsible administrations to safeguard indigenous land rights and therefore also ecological ways of knowing. From a top-down perspective, approaches such as rights of personhood for natural actors may come closer to the realization of indigenous understandings of nature in the Anthropocene (Kalonaityte, 2018). In June 2019, a Colombian court granted rights of personhood to the river Cauca, its watershed, organisms and all future generations that sustain a living from it, currently around 130 000 people in the lower Cauca region (Semana Sostenible, 2019). It ordered the restoration of its ecological functions but stopped short of ordering the removal of the Hidroituango hydropower project. While this project masters the Cauca river, it also mobilized resistance to the large-scale anthropogenic appropriation of free-flowing rivers, resistance that possibly would not have arisen had the project not failed so spectacularly.

The Cauca river does not only convey water, fish and gold but also knowledge. Neither its material components nor this knowledge can flow freely if trapped behind a 200m dam. The struggle of indigenous peoples world-wide to safeguard their knowledges and cultural heritage (UNDESA, 2019) is a struggle that deserves more recognition because these ways of knowing and being are common human heritage from pre-modern times and have been lost in most contemporary industrial societies. Traditional ecological knowledge is irreplaceable. The empirical work of thousands of individuals over countless generations in the past cannot be replaced by the work of a few professional scientists in the future. If traditional ecological knowledge is lost, it is lost for good. Like a species that is locally extinct but where some individuals have survived in an undisturbed place and return to repopulate their prior habitat, traditional ecological knowledges and practices surviving in contemporary ecological commons may one day reassert themselves also in post-industrial societies. However, extractivism and 'small wars' that are fueled by resource rents threaten a possible re-establishment of ecological commons: By de-legitimizing and destroying traditional ecological knowledge in the quest to maintain and increase current rates of extraction, humans are not only destroying their common past but also undermining their common future. They are literally damming the rivers of wisdom from which future generations could draw the intellectual tools for a sustainable Anthropocene.

Literature

Acosta, A. (2012). Extractivismo y Neoextractivismo: Dos caras de la misma maldición. In G. P. Desarrollo, *Más allá del desarrollo* (pp. 83-121). México: Fundación Rosa Luxemburg/Abya Yala.

Andrade-Sastoque, E., & Jímenez, B. A. (2016). Trayectoria socio-tecnica de las relaciones entre extractivismo y desarrollo sostenible: El caso de la Colosa en Colombia. *Redes, 22*(43), 33-64.

Alcott, B. (2015). Jevon's Paradox (Rebound Effect). In F. D. Giacomo D'Alisa, & G. K. (Eds.), *Degrowth: A vocabulary for a new era* (pp. 151-153). New York: Routledge.

Amat, Y. (2019, April 14). *Por daño de Hidroituango, desastre ecológico amenaza al río Cauca.* Retrieved from El Tiempo - Investigación: https://www.eltiempo.com/justicia/investigacion/por-dano-de-hidroituango-desastre-ecologico-amenaza-al-rio-cauca-349486

Berthoud, G. (2010). Market. In W. S. (Ed.), *The Development Dictionary: a guide to knowledge as power, 2nd Edition* (pp. 74-94). London: Zed Books.

Betancur, S. (2017, June 14). *Para construir la paz es necesario frenar la concentración de la tierra.* Retrieved from Boletín Paz para el Cambio: http://www.ipc.org.co/agenciadeprensa/index.php/2017/06/14/para-construir-la-paz-es-necesario-frenar-la-concentracion-de-la-tierra/

Bridge, G. (2009). Material Worlds: Natural Resources, Resource Geography and the Material Economy. *Geography Compass, 3*(3), 1217–1244.

Brownhill, L., Turner, T. E., & Kaara, W. (2012). Degrowth? How About Some "De-alienation"? *Capitalism Nature Socialism, 23*(1), 93-104.

Burgis, T. (2016). *The Looting Machine: Warlords, Tycoons, Smugglers, and the Systematic Theft of Africas Wealth.* London: William Collins.

Cámara de Comercio de Medellín. (2017). *Perfil socioeconómico de la subregión del Bajo Cauca.* Medellín: Cámara de Comercio de Medellín.

Cárdenas Grajales, G. I. (2010). El Conocimiento Tradicional y El Concepto de Territorio. *Núcleo de Estudos, Pesquisas e Projetos de Reforma Agrária*.

Calle, D. S., Rodríguez, A. I., Osorio, A., & Jimenez, M. E. (15 de June de 2018). *Lo que no hizo la guerra en 50 anos, Hidro-Ituango lo hizo en 15 días.* Obtenido de Sala de Crisis Social - Informe 1: https://kavilando.org/lineas-kavilando/territorio-y-despojo/6237-informe-de-sala-de-crisis-ante-comision-accidental-hidroituango

Callon, M. (1986). Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In J. L. (Ed.), *Power, action and belief: a new sociology of knowledge?* (pp. 196-223). London: Routledge.

Cardona, C. A., Pinilla, M., & Gálvez, A. (2016). ¡A un lado, que viene el progreso! Construcción del proyecto Hidroituango en el cañón del Cauca medio antioqueño, Colombia . En S. C. Astrid Ulloa, *Extractivismos y posconflicto en Colombia: retos para la paz territorial* (págs. 303-333). Bogotá: Universidad Nacional de Colombia sede Bogotá,Grupo de Investigación Cultura y Ambiente Facultad de Ciencias Humanas.

Casey, N. (2019, May 17). Colombia's Peace Deal Promised a New Era. So Why Are These Rebels Rearming? *New York Times*, pp. Retrieved from: https://www.nytimes.com/2019/05/17/world/americas/colombia-farc-peace-deal.html.

Casey, N. (2019b, May 18). *Colombia Army's New Kill Orders Send Chills Down Ranks.* Retrieved from The New York TImes - World - Americas: https://www.nytimes.com/2019/05/18/world/americas/colombian-army-killings.html

Céspedes Melo, R., & Niño Muñoz, F. A. (2014). *Retrospectiva del Manejo del Recurso Hidrico de los Zenúes en la Región de la Mojana.* Bogotá: Universidad Catolica de Colombia.

Cohen, N. (2017, January 16). *Colombia's other war.* Retrieved from Le Monde Diplomatique: https://mondediplo.com/outsidein/colombia-s-other-war

Collier, P. (2009). The Political Economy of State Failure. *Oxford Review of Economic Policy*.

Conde, M., & Walter, M. (2015). Commodity Frontiers. In G. D'Alisa, F. Demaria, & G. K. (Eds.), *Degrowth: A vocabulary for a new era* (pp. 99-104). New York: Routledge.

CORANTIOQUIA. (2005). *Caracterización y Cuantificación de las Areas Degradadas en la Territorial Panzenú.* Medellín: Corporación Autónoma Regional del Centro de Antioquia.

Corporación Jurídica Libertad . (2019, February 26). *Colombia Nunca Más: Extractivismo - Graves Violaciones a los Derechos Humanos. Caso Hidroituango, una lucha por la memoria y contra la impunidad.* Retrieved from Corporación Jurídica Libertad - Publicaciones: https://cjlibertad.org/publicaciones/102-libros/1322-libro-colombia-nunca-mas-extractivismo-graves-violaciones-a-los-derechos-humanos-caso-hidroituango-una-lucha-por-la-memoria-y-contra-la-impunidad.html

Cotes-Cantillo, K., Vargas-Sandoval, G. A., Alvis-Zakzuk, N., Díaz-Jiménez, D., Vallejo, E. D., & Castañeda-Orjuela, C. (2016, September). Una mirada al ASIS y análisis en profundidad: Hambre y desnutrición en La Guajira. *Boletín técnico interactivo, 8*.

Daly, H. E. (2007). *Ecological Economics and Sustainable Development, Selected Essays of Herman Daly.* Cheltenham, UK, Northampton, MA, USA: Edward Elgar.

David Higuita, J. E. (14 de June de 2018). *Hidroituango y los Nutabes.* Obtenido de Kavilando.org: https://www.kavilando.org/lineas-kavilando/territorio-y-despojo/6235-hidroituango-y-los-nutabes

Defensoría del Pueblo. (2018). *Alerta Temprana de Inminencia N° 031-18.* Bogota: Defensoría del Pueblo Colombia.

Delle Rose, M. (2012). Decision-making errors and socio-political disputes over the Vajont Dam disaster. *Disaster Advances*.

Díaz, S., Settele, J., & Brondízio, E. (2019, May 6). *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* Retrieved from IPBES Global Assessment Summary for Policymakers: https://www.ipbes.net/sites/default/files/downloads/spm_unedited_advance_for_posting_htn.pdf

El Espectador. (2019, April 4). *El oro genera más ganancias que la cocaína, advierte el fiscal Martínez.* Retrieved from El Espectador - Judiciales: https://www.elespectador.com/noticias/judicial/el-oro-genera-mas-ganancias-que-la-cocaina-advierte-el-fiscal-martinez-articulo-848734

Escobar, A. (2016). Thinking-feeling with the Earth: Territorial Struggles and the Ontological Dimension of the Epistemologies of the South. *Revista de Antropología Iberoamericana, 11*(1), 11-32.

Esteva, G. (2014). Commoning in the new society. *Community Development Journal., 49*(is), i144–i159.

Farmer, P. (2009). On Suffering and Structural Violence: A View from Below. *Race/Ethnicity: Multidisciplinary Global Contexts, 3*(1), 11-28.

Fundación Paz y Reconciliación. (2018). *Como va la Paz en Antioquia 2018.* Retrieved from PARE: https://pares.com.co/wp-content/uploads/2018/06/Cómo-va-la-paz-Antioquia-2018.pdf

Galeano, E. (2015). *Las Venas Abiertas de América Latina .* Madrid: Siglo XXI España.

García, O., Veiga, M. M., Cordy, P., Suescún, O. E., Molina, J. M., & Roeser, M. (2015). Artisanal gold mining in Antioquia, Colombia: a successful case of mercury reduction. *Journal of Cleaner Production, 90*, 244-252.

Gellert, P. K., & Lynch, B. D. (2003). Mega-projects as displacements. *International Social Science Journal, 55*(175), 15-25.

Gobernación de Antioquia. (2016, April). *Annuario Estádistico 2016*. Retrieved from http://www.antioquiadatos.gov.co/index.php/20-2-1-poblacion-pobre-y-en-miseria-por-necesidades-basicas-insatisfechas-nbi-en-los-municipios-de-antioquia-ano-2005

Grosfoguel, R. (2013). The Structure of Knowledge in Westernized Universities: Epistemic Racism/Sexism and the Four Genocides/Epistemicides of the Long 16th Century. *Human Architecture: Journal of the Sociology of Self- Knowledge, 11*(1), 73-90.

Grosfoguel, R. (2016). From 'economic extractivism' to 'epistemical extractivism' and 'ontological Extractivism': a destructive way to know, be and behave in the world. *Tabula Rasa, 24*, 123-143.

Gudynas, E. (2014). Los Extractivismos en sus Contextos Globales, Regionales y Locales. In M. S. Internacional, *Extractivismo en América Latina... Agua que no has de beber* (pp. 11-24). Santiago de Chile: Observatorio Latinoamericano de Conflictos Ambientales - OLCA y Observatorio de Conflictos

Mineros de América Latina - OCMAL.

Gudynas, E. (2015). *Extractivismos: Ecología, economía y política de un modo de entender el desarrollo y la Naturaleza.* Cochabamba: Centro de Documentación e Información Bolivia.

Gudynas, E. (2016). Modos de producción y modos de apropiación, una distinción a propósito de los extractivismos. *Actuel Marx Intervenciones, 20*, 95-121.

Gudynas, E. (2016). Teología de los extractivismos. *Tabula Rasa, 24*, 11-23.

Gudynas, E. (2017). Extractivismos y corrupción en América del Sur. *RevIISE, 10*(10), 73-87.

Gómez-Baggethun, E. (2015). Commodification. In F. Demaria, G. Kallis, & G. D. (Eds.), *Degrowth: A vocabulary for a new Era* (pp. 95-98). New York: Routledge.

Gómez-Restrepo, C., Rincóna, C. J., & Urrego-Mendoza, Z. (2016). Salud mental, sufrimiento emocional, problemas y trastornos mentales de indígenas colombianos. Datos de la Encuesta Nacional de Salud Mental 2015. *Revista Colombiana de Psiquiatría, 45*(1), 119-126.

Hall, B. L., & Tandon, R. (2017). Decolonization of knowledge, epistemicide, participatory research and higher education. *Research for All, 1*(1), 6-19.

Huaman, E. S. (2015). Indigenous-Minded Innovation in Shifting Ecologies . In E. S. Huaman, & B. S. (Eds.), *Indigenous Innovation Universalities and Peculiarities* (pp. 1-11). Rotterdam: Sense Publishers.

Human Rights Everywhere. (2018, May 15). *Hidroituango: Desaparecer a los Desaparecidos.* Retrieved from Desaparecionforzada.co: https://colombiaplural.com/wp-content/uploads/2018/05/Hidroituango-desaparecer-a-los-desaparecidos.pdf

International Resource Panel; UNEP. (2016). *Global Material Flows and Productivity: Assessment Report for the UNEP International Resource Panel .* Retrieved from UN Document Repository: http://wedocs.unep.org/bitstream/handle/20.500.11822/21557/global_material_flows_full_report_english.pdf?sequence=1&isAllowed=y

Jímenez, J. D. (6 de June de 2018). *Los tres riesgos críticos que afronta Hidroituango.* Obtenido de El Colombiano - Antioquia: https://www.elcolombiano.com/antioquia/hidroituango-riesgos-que-

afronta-el-proyecto-IL8814028

Kalonaityte, V. (2018). When rivers go to court: The Anthropocene in organization studies through the lens of Jacques Rancière. *Organization, 25*(4), 517-532.

Keen, D. (1998). The Economic Functions of Violence in Civil Wars - Introduction. *The Adelphi Papers, 38*(320), 9-13.

Klein, N. (2014). *This Changes Everything: Capitalism vs. The Climate.* London: Penguin Books.

Korf, B. (2011). Resources, violence and the telluric geographies of small wars. *Progress in Human Geography, 35*(6), 733–756.

Latouche, S. (2004, November). Degrowth Economics: Why less should be so much more. *Le Monde Diplomatique*.

Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory.* Oxford: Oxford University Press.

Law, J. (1986). On the Methods of Long Distance Control: Vessels, Navigation, and the Portuguese Route to India. In J. L. (ed), *Power, Action and Belief: A New Sociology of Knowledge?* (pp. 234-263). Henley: Routledge.

Law, J. (1992). *Notes on the Theory of the Actor Network: Ordering, Strategy and Heterogeneity.* Retrieved October 2018, from Centre for Science Studies, Lancaster University: http://www.comp.lancs.ac.uk/sociology/papers/Law-Notes-on-ANT.pdf

Law, J. (2004). *After Method: Mess in Social Science Research.* New York: Routledge.

Law, J. (2007, April 25th). *Actor Network Theory and Material Semiotics.* Retrieved from Heterogeneities.net: http://www.heterogeneities.net/publications/Law2007ANTandMaterialSemiotics.pdf

Law, J. (2011, Spetember 25th). *What's Wrong with a One-World World.* Retrieved from Heterogeneities.net:

http://www.heterogeneities.net/publications/Law2011WhatsWrongWithAOneWorldWorl d.pdf

Law, J. (2017). STS as Method. In U. Felt, R. F. Clark, A. Miller, & L. Smith-Doerr, *The Handbook of Science and Technology Studies, 4th Edition* (pp. 31-58). Cambridge, MA: MIT Press.

Law, J., & Callon, M. (1997). After the individual in society: lessons on collectivity from science, technology and society. *Canadian Journal of Sociology, 22*(2), 165-182.

Linebaugh, P. (2008). *The Magna Carta Manifesto: Liberties and Commons for All.* Berkeley: University of California Press. Retrieved from University of California Press, Berkeley: https://provisionaluniversity.files.wordpress.com/2012/12/peter-linebaugh-the-magna-carta-manifesto-liberties-and-commons-for-all-2008.pdf

Maclean, K. (2015). *Cultural Hybridity and the Environment: Strategies to celebrate local and Indigenous knowledge* . Singapore Heidelberg New York Dordrecht London: Springer.

Magee, C. L., & Devezas, T. C. (2017). A simple extension of dematerialization theory: Incorporation of technical progress and the rebound effect. *Technological Forecasting & Social Change, 117*, 196-205.

Malamud, M. (2018). The Environment as a Factor in Small Wars. *Small Wars & Insurgencies, 29*(2), 245-268.

Marcos, A. (2018, May 18). *Más de 9.000 evacuados por la obstrucción de una presa en Colombia.* Retrieved from El País: https://elpais.com/internacional/2018/05/17/colombia/1526573932_799098.html

Martinez-Alier, J. (2015). Currents of Environmentalism. In F. D. Giacomo D'Alisa, *Degrowth: A vocabulary for a new era* (pp. 65-67). New York City: Routledge.

Mercado, D. A. (2019, April 9). *Hay unos 53 derrumbes en el embalse de Hidroituango: EPM.* Retrieved from El Tiempo - Medellin: https://www.eltiempo.com/colombia/medellin/derrumbes-en-el-embalse-de-hidroituango-347286

Mignolo, W. D. (2011). *The Darker Side of Western Modernity: Global Futures, Decolonial Options.* Durham & London: Duke University Press.

Mukherjee, S. (2016). *The Gene: An Intimate History.* London: Vintage.

Mulder, K. F. (2007). Innovation for sustainable development: from environmental design to transition management. *Sustainability Science, 2*, 253-263.

North, D. C., Wallis, J. J., Webb, S. B., & Weingast, B. R. (2011). *Limited Access Orders: Rethinking the Problems of Development and Violence.* Stanford University.

Netherlands Statistics. (2017, June 28). *1,894 suicides in 2016.* Retrieved from Netherlands Statistics - News: https://www.cbs.nl/en-gb/news/2017/26/1-894-suicides-in-2016

Nyamnjoh, F. B. (2012). 'Potted Plants in Greenhouses': A Critical Reflection on the Resilience of Colonial Education in Africa. *Journal of Asian and African Studies, 47*(2), 129-154.

ONIC. (2018, May 10). *Pueblos Indígenas de la OIA se movilizarán en Minga en el Bajo Cauca Antioqueño.* Retrieved from Organización Nacional Indigena de Colomnbia: https://www.onic.org.co/comunicados-regionales/2369-pueblos-indigenas-de-la-oia-se-movilizaran-en-minga-en-el-bajo-cauca-antioqueno

ONIC. (2019, April 2). *Embera Dobidá.* Retrieved from Organización Nacional Indígena de Colombia: https://www.onic.org.co/pueblos/1094-embera

ONIC. (2019, April 2). *Nutabe.* Retrieved from Organización Nacional Indígena de Colombia: https://www.onic.org.co/pueblos/2218-nutabe

Ortiz-Riomalo, J. F., & Rettberg, A. (2017). Minería de oro, conflicto y criminalidad en los albores del siglo xxi en Colombia: Perspectivas para el posconflicto colombiano. *Colombia Internacional, 93*, 17-63.

OXFAM. (2017, July 4). *Radiografía de la Desigualdad: Lo que nos dice el último Censo Agropecuario sobre la Distribución de la Tierra en Colombia.* Retrieved from oxfam.org: https://www-cdn.oxfam.org/s3fs-public/file_attachments/radiografia_de_la_desigualdad.pdf

Philipp, T. (2007). *Die Actor-Network Theory.* Wiesbaden: Springer .

Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin, F. S., Lambin, E. F., . . . Rodhe, H. (2009). A safe operating space for humanity. *Nature, 461*(24).

Romano, O. (2015). Anti-Utilitarianism. In G. D'Alisa, F. Demaria, & G. K. (Eds.), *Degrowth: A Vocabulary for a new era* (pp. 49-52). New York City: Routledge.

Sachs, W. (2010). One World . In W. S. (Ed.), *The Development Dictionary: A guide to knowledge as power, 2nd Edition* (pp. 111-126). New York: Zed Books.

Saed. (2012). Introduction to the Degrowth Symposium. *Capitalism Nature Socialism, 23*(1), 26-29.

Saldaña, J. (2013). *The Coding Manual for Qualitative Researchers 2nd edition.* Thousand Oaks: Sage Publications.

Salganik, M. J., & Heckathorn, D. D. (2004). 5. Sampling and Estimation in Hidden Populations Using Respondent-Driven Sampling. *Sociological Methodology*, *34*(1), 193–240.

Santos, B. d. (2016). *Epistemologies of the South - Justice Against Epistemicide.* New York City: Routledge.

Semana Sostenible. (2019, January 31). *Golpe a minería ilegal en Antioquia.* Retrieved from Medio Ambiente: https://sostenibilidad.semana.com/medio-ambiente/articulo/golpe-a-mineria-ilegal-en-antioquia/42703

Semana Sostenible. (2019, June 20). *Histórico: declaran al río Cauca como sujeto de derechos.* Retrieved from Semana Sostenible - Medio Ambiente: https://sostenibilidad.semana.com/medio-ambiente/articulo/historico-declaran-al-rio-cauca-como-sujeto-de-derechos/44662

Shiva, V. (2010). Resources. In W. S. (Ed.), *The Development Dictionary 2nd Edition* (pp. 228-243). New York : Zed Books.

Snyder, R. (2006). Does Lootable Wealth Breed Disorder? *Comparative Political Studie, 39*(8), 943-968.

Sousa Santos, B. d. (2016). *Epistemologies of the South - Justice Against Epistemicide.* New York City:

Routledge.

Strathern, M. (1999). What is intellectual property after? *The Sociological Review, 47*(S1), 156-180.

Suter, N. (2012). Qualitative Data, Analysis, and Design. In N. Suter, *Introduction to Educational Research: A Critical Thinking Approach* (pp. 342-386). Thousand Oaks: Sage Publications.

Tauli-Corpuz, V., Alcorn, J., & Molnar, A. (2018, June). *Cornered by Protected Areas: Replacing 'Fortress' Conservation with Rights-based Approaches Helps Bring Justice for Indigenous Peoples and Local Communities, Reduces Conflict, and Enables Cost-effective Conservation and Climate Action.* Retrieved from Cornered by Protected Areas: https://rightsandresources.org/wp-content/uploads/2018/06/Cornered-by-PAs-Brief_RRI_June-2018.pdf

Tsing, A. L. (2003). Natural Resources and Capitalist Frontiers. *Economic and Political Weekly, 38*(40), 5100-5106.

Ullrich, O. (2010). Technology. In W. S. (Ed.), *The Development Dictionary: A Guide to Knowledge as Power, 2nd Edition* (pp. 308-322). London & New York: Zed Books.

UNDESA. (2019, 01 31). *Culture*. Retrieved from United Nations - Indigenous Peoples: https://www.un.org/development/desa/indigenouspeoples/mandated-areas1/culture.html

UNDESA. (2019, January 31). *United Nations - Indigenous Peoples*. Retrieved from: https://www.un.org/development/desa/indigenouspeoples/mandated-areas1/culture.html

UNDP. (2012). *Regiones en conflicto comprender para transformar Bajo Cauca, Huila, Meta, Montes de María y Nariño.* Bogotá: United Nations Development Program - National Report on Human Development.

UNEP. (2016). *Global Material Flows and Productivity: Assessment Report for the UNEP International Resource Panel .* Retrieved from UN Document Repository: http://wedocs.unep.org/bitstream/handle/20.500.11822/21557/global

UNODC. (2018). *World Drug Report 2018.* Vienna: United Nations Office on Drugs and Crime .

UNODC; Gobierno de Colombia. (2017). *Presentación Informe anual de cultivos ilicitos .* Bogotá:

UNODC.

Valladares, C., & Boelens, R. (2017). Extractivism and the rights of nature: governmentality, ‘convenient communities’ and epistemic pacts in Ecuador. *Environmental Politics, 26*(6), 1015-1034.

Vidal, J. (2014, April 18). *Botswana bushmen: 'If you deny us the right to hunt, you are killing us'.* Retrieved from The Guardian - Land Rights: https://www.theguardian.com/environment/2014/apr/18/kalahari-bushmen-hunting-ban-prince-charles

Villegas, M. G., & Rebolledo, J. R. (2018). La Construcción del Estado Local en Colombia. *análisis político, 92*, 69-95.

Watson-Verran, H., & Turnbull, D. (1995). Science and Other Indigenous Knowledge Systems. In G. E. Sheila Jasanoff, *Handbook of Science and Technology Studies* (pp. 115-139). Thousand Oaks: Sage Publications.

Weston, B. H., & Bollier, D. (2013). *Green governance : ecological survival, human rights, and the law of the commons.* Cambridge, Ma: Cambridge University Press.

Wilder, B. T., O'Meara, C., Monti, L., & Nabhan, G. P. (2016). The Importance of Indigenous Knowledge in Curbing the Loss of Language and Biodiversity. *BioScience, 66*(6), 499-509.

Wright, C., Nyberg, D., Rickards, L., & Freund, J. (2018). Organizing in the Anthropocene. *Organization, 25*(4), 455–471.

Zuleta, I. (9 de July de 2018). *Colombia: Hidroituango causó más desplazamientos forzados que la guerra en el cañon del río Cauca.* Obtenido de Redes - Amigos de la Tierra uruguay: https://www.redes.org.uy/2018/07/09/colombia-hidroituango-causo-mas-desplazamientos-forzados-que-la-guerra-en-el-canon-del-rio-cauca/

Appendix

Table 1. Interview Respondents

N°	Code Name	Function	Date interviewed	Length
1	Respondent 1	School Director in Rural Community	3rd of September 2017	51 min.
2	Respondent 2	Project Administrator, Innovation Company	29th of May 2018	57 min.
3	Respondent 4	Materials Engineer, State University (UDEA)	30th of May 2018	1:02 h.
4	Respondent 5	Legal Representative, OIA (Indigenous Organization of Antioquia)	30th of May 2018	1:31 h.
5	Respondent 6	Legal Representative, Agroecology & Subsistence Miners	31st of May 2018	1:44 h.
6	Respondent 7	Environmental Engineer, CORANTIOQUA (State Environmental Agency)	31st of May 2018	44 min
7	Respondent 8	Senior Administrative Official, State University (UDEA)	15th of June 2018	1:10 h.
8	Respondent 9	Municipal Official	19th of June 2018	50 min.
9	Respondent 10	Senior Official, State Administration (Antioquia)	21st of June 2018	45 min.
10	Respondent 11	Investigator, Institute of Popular Education	22nd of June 2018	50 min.
11	Respondent 12	Engineer, Eafit University	22nd of June 2018	1:22 min
11	Respondent 13	Engineer, Eafit University	22nd of June 2018	-
12	Respondent 14	Indigenous Town Hall Representative	3rd of July 2018	45 min.
13	Respondent 15	Legal Representative, Rubber Farmer Association	3rd of July 2018	1:06
14	Respondent 16	Technical Officer, State Secretary for Agriculture	4th of July 2018	1:11
15	Respondent 17	Senior official, Institution charged with restituting land	9th of July 2018	1:18 h.
16	Respondent 18	Municipal Official (Secretary for Development)	9th of July 2018	35 min.
17	Respondent 19	Indigenous Healer from Emberá Community	10th of July 2018	13 min.
18	Respondent 20	USAID Subcontractor, Human Rights Program	11th of July 2018	33 min.
19	Respondent 21	Indigenous Chief of Municipality	11th of July 2018	1:25 h.
20	Respondent 22	Indigenous Mental Health Program, State University (UDEA)	13th of July 2018	1:13 h.
20	Respondent 23	Indigenous Mental Health Program, State University (UDEA)	13th of July 2018	-
20	Respondent 24	Indigenous Mental Health Program, State University (UDEA)	13th of July 2018	-
21	Respondent 25	Indigenous Town Hall Representative	16th of July 2018	46 min.
22	Respondent 26	School Teacher, Rural Community	17th of July 2018	1.05 h.
23	Respondent 27	Chief of Zenú Indigenous Community	20th of July 2018	52 min.