



‘Little Development, Few Economic Opportunities and Many Difficulties’: Climate Change from a Local Perspective

David Rodríguez Goyes

Universidad Antonio Nariño, Colombia

University of Oslo, Norway

Abstract

A southern criminology perspective on the study of climate change is overdue, given that climate change is a global phenomenon with localised effects. This article is a southern empirical criminological study of the colonial causes of, justice consequences of and southern responses to climate change. The study is based on four years of research in the Colombian Río Negro basin, undertaken by a multidisciplinary team of which I was part. My main argument is that the region contributes to climate change and heightening local risks primarily because of Western-imposed cultural ideas and production practices, and market demands. The article also discusses the idea of returning to southern traditional practices to mitigate and adapt to climate change.

Keywords

Climate change; Colombia; epistemologies of the south; green criminology; southern criminology.

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A Glocal Phenomenon

The position of a community in the global political economy is one of the main determinants of the impact that climate change will have on it. The population of the Río Negro Basin, the focus of this study, provides an example of this. Predominantly inhabited by peasants who struggle to make ends meet, this region is one of 'little development, few economic opportunities and many difficulties accessing those opportunities' that exist (Grupo de Biotecnología Ambiental 2015a, 24). The inhabitants are, if categorised under the problematic label of 'race', mestizos and mulattos, with African, European and Indigenous ancestors (for a critical discussion of 'race' as a social category, see e.g., Barragán 2011). When using Marxist theory as reference, members of the Río Negro Basin peasant communities would be categorised as part of the proletariat (see detailed discussion below). Consequently, an intersectionality analysis would understand the peasants of the Río Negro Basin as subjects of two social vulnerabilities: their 'race' and class. While not the focus of this article, women—who comprise roughly 50 per cent of the population—are arguably the most affected by the hardships endured by these peasant communities; first, due to the well-known machismo nature of Colombian culture (see e.g., Lemaitre and Sandvik 2015), and second, due to the global gender dynamics of victimisation under climate change (Heckenberg and Johnston 2012; Wachholz 2007).

These peasants rely on a small set of activities to cover their basic needs. Their main economic activities are coffee and sugarcane production and small animal husbandry. Climate change has adversely affected their struggle. For instance, the region faces two climatic phenomena intensified by climate change: El Fenómeno de la Niña (the phenomenon of the little girl) brings intense, extended periods of rain (Bedoya and López-Lezama 2015) and el Fenómeno del Niño (the phenomenon of the little boy) brings intense, extended dry, warm periods (Staupe-Delgado and Kruke 2017). During rainy periods, the Río Negro Basin experiences floods and landslides because of unstable ground. During dry seasons, the region faces diminished agricultural production, mass animal deaths because of dehydration and increased epidemics among animals and people brought on by water shortages. These consequences directly and indirectly affect the wellbeing of humans, non-human animals and ecosystems. However, because of economic limitations, power imbalances, market pressures and the immediacy of other needs, the human population of the Río Negro Basin is poorly situated to plan effective strategies to mitigate and adapt to the risks posed by climate change.

The Río Negro Basin is a useful case study in terms of criminology in three main ways; first, from a harm perspective (see e.g., Davies, Francies and Wyatt 2014), climate change in the region is a systematic and structural factor in the reduction of wellbeing. Second, some of the changes brought about by climate change (like water scarcity and drought) are a source of conflict among the various communities that inhabit the region. Third, framing climate change as a global problem that is experienced locally is clearly an exercise in eco-global criminological thinking (White 2012a). Based on a southern green criminological perspective, I identify the main causes behind the region's heightened contributions to climate change and the resulting risks to humans, non-human animals and ecosystems. As such, this study advances a localised, southern criminological study of climate change to contextualise the findings, acknowledge north-south divides and their consequences and integrate scholars from the Global South into the study of the issue. The main argument advanced is that the roots of the region's contribution to climate change and the heightening of its impact on the local context are found in Western cultural ideas and production practices, and market demands imposed on the region. The article also discusses the idea of returning to southern traditional practices to mitigate and adapt to climate change. To substantiate these arguments, I have divided the article into seven sections. In the first part, I discuss the ways criminology has engaged climate change. Second, I present the theoretical basis for my analysis. In the third section, I summarise the methods used to gather data, reference the ethics protocols applied and outline the source of funding of this research. The fourth section presents the context of the study, including an account of the biophysical and economic

characteristics of the region. In the fifth section, I analyse the data, organised around the three main creators of risk: cultural, market and scientific forces. The sixth section, based on the findings of the article, focuses on some possible responses to climate change in the Río Negro Basin region. In the conclusion, I discuss the *progress parabola*.

Climate Change and Criminology

Most scientists and politicians, based on over 50 years of evidence, agree that anthropogenic emissions of carbon dioxide and other greenhouse gases have caused increases in Earth's global mean temperature, and consequently, climate change (Gilmore 2017). Just as humans affect climate change, climate change also has important repercussions for the natural environments in which humans live. For instance, climate change contributes to the extinction of plant and animal species and rising sea levels, threatening human communities. It is anticipated that increased precipitation will cause droughts and floods throughout the world, resulting in food scarcity and underproduction (Selin 2018) and water and energy shortages. Prominent thinkers in the history of criminology and sociology agree that abrupt changes in social conditions and practices bring about increased social conflicts (e.g., Christie 1975; Merton 2002; Park 1999). This conclusion holds true in the matter of climate change as well. The sudden harshening of conditions, the changes in ordinary practices and the decreased availability of goods will lead to more and stronger social conflict (Agnew 2012). It is in this setting that criminology becomes a relevant discipline for the study of climate change.

In the half decade since White, in one of the first books dedicated to the study of climate change from a criminological perspective (2012b; see also Farrall, Ahmed and French 2012; White 2017), outlined seven ways criminology can engage with the study of social phenomena associated with climate change, criminology has brought several topics and perspectives to the study of this phenomenon. With a pedagogical intention, I combine the typology offered by White (2012b) with that suggested by McClanahan (2017) to portray the issues that criminologists have studied in their explorations of climate change. The cogs in the 'wheels of climate change' are the interconnected aspects of climate change that are relevant to criminology. Movement of one cog results in the movement of others. The idea of imagining climate change, along with responses and harms, as interrelated cogs pushes forward a more ecological paradigm in green criminology. Instead of thinking in terms of discrete and distinct environments, it allows for integrated, connected ecologies.

Criminologists studying *crimes that contribute to climate change* (cog 1) are interested in identifying the practices that contribute majorly to anthropocentrically induced climate change. Since one of the tenets of green criminology is its expansion of the concept of crime to include harms, that is, lawful but detrimental activities (Beirne and South 2007; Dybing 2012; Potter 2014; Sollund 2015; South 2008), it follows that green criminologists are interested in identifying and understanding the harmful logics and dynamics, whether criminal or not, that contribute to climate change. The most substantial findings by these criminologists indicate that climate change is mainly produced by corporate-state practices, including some commercial transactions and the sponsoring of climate change denial, that are pushing the world towards collapse (e.g., Kramer and Michalowski 2012; White and Kramer 2015). The second cog comprises the *crimes that are the result of or facilitated by climate change*. Studies with this focus view climate change as a criminogenic force. A major contribution is the work of Agnew (2012), who used strain theory to determine that the effects of climate change, such as food and water scarcity, generate stress in societies. Such stress weakens both the social fabric and the formal and informal mechanisms of social control, all resulting in increased and more intense conflicts. In this category are acts like human trafficking, which exploits the needs of environmental migrants (e.g., Hall 2012), and sexual violence in the context of natural disasters that disproportionately affect women (Heckenberg and Johnston 2012). Fussey and South (2012) warn that crimes and conflicts resulting from climate change reach beyond the individual level and can be carried out

by states or between states. The third cog in the wheel of climate change is that of *offences related to mitigation or adaptation strategies*, which are new offences introduced in national legislations by regulatory bodies to try to curb climate change (Hall and Farrall 2013). For instance, Farrall (2012, 16) warns that activities that are not yet illegal, like discarding non-recyclable household waste items and frequent air travel deemed unnecessary, could be criminalised. The fourth cog is the *victimisation of humans, animals and ecosystems*, which happens as a result of the activity of the first three cogs. Emphasis in victimisation studies has been placed on those who are usually overrepresented as victims of climate change, such as non-human animals (Sollund 2012), women and populations of the Global South (Heckenberg and Johnston 2012). *Responses to climate change* comprise the fifth cog. These can be laws and regulations issued by states, international agreements, litigations or changes to social practices at the grassroots level. The exploration of the responses to climate change is not limited to what already exists. It includes what could be done to efficiently confront climate change and reduce the harms it causes.

A Southern Criminological Theory and the Epistemologies of the South

A southern criminology can contribute to the study of climate change as a criminological issue in an important way by contextualising the findings, acknowledging north–south divides and their consequences, and integrating scholars from the Global South into the study of climate change. The idea of the need of a criminology attuned to the realities of the Global South is not entirely new (see e.g., Aas 2012; Agozino 2004; Amin 2009 [1988]; Aniyar de Castro 1987; Moosavi 2018). These ideas have lain dormant and were only reawakened by Carrington, Hogg and Sozzo (2016) with their call for a southern criminology that included the acknowledgement of contextual particularities and the democratisation of epistemologies that would level the power imbalances that privilege knowledges produced in the metropolitan centres of the north. Thus, a southern criminology is a criminological perspective that produces knowledge that is attentive to the contextual and spatial differences of the site of knowledge production and that also challenges the northern dominance in the production of criminological knowledge by facilitating the inclusion of voices from the south. The project led by Carrington et al. (2016) seeks to redress the inequitable production/visibility of academic knowledge in which the Global North, despite containing only 15 per cent of the world's population, produces most of what is credited as scientific knowledge. Carrington et al.'s call is backed by two realities. First, in general, most (and the most atrocious) crimes and harms take place in the Global South, which also holds true for climate change and its effects. Second, criminologists from the Global South have remained almost invisible to the international community until now. To address these imbalances, a southern criminology seeks to exploit them to provide substantial innovative, refreshing and original criminological knowledge capable of challenging the Anglo-dominance in criminology, and most importantly, to arrive at a deeper and more nuanced understanding of criminological topics, including climate change, by giving the south its adequate due.

Several examples of both direct (e.g., Brisman, South and Walters 2018) and indirect (e.g., Mol 2016) southern criminological studies of climate change already exist. Obviously, my attempt is not the first to position a southern criminology vis-à-vis climate change. However, most southern criminology studies of climate change, direct or indirect, have not employed the epistemologies of the south, which is my intention here. Indeed, a southern criminology as described by Carrington and colleagues (2016) is not necessarily the same as the criminological contributions of the epistemologies of the south. The 'epistemologies of the south' is a metaphor for the knowledge production of the marginalised. This is knowledge that is urgently needed and essential for survival, to minimise suffering and fulfil the most basic needs of the marginalised (Santos 2014). The epistemologies of the south embrace the 'south' as a metaphor of peripheral voices located anywhere in the world rather than as a geographical entity. Incorporating the epistemologies of the south into criminology implies the need to 'take seriously the epistemic force of local histories and to think theory through from the political praxis of subaltern groups' (Escobar 2003, 61). Nurturing criminology with the epistemologies of the south is what

Mathiesen (2017) calls 'a science from below'. This is the use of social reality itself to understand social reality, or grassroots scientific activity. In the case of climate change, it is the perspective of those experiencing it most directly and immediately. To be sure, employing the epistemologies of the south in the study of climate change is coherent with the southern criminology project; both attend to contextual specificities and minimise the imbalance of global knowledge. The combination of a southern criminology with a criminology developed from the epistemologies of the south can be the most theoretically innovative. Such a combined criminology implies listening and acknowledging the epistemological power of those who, as inhabitants of the Global South, are directly affected by climate change. The study of the Río Negro Basin region allows for such a process.

So far, I have proposed a theoretical model/way of thinking about climate change from a perspective that fully considers the role of geography and social position and acknowledges the epistemological power of subaltern groups. In the next sections, I transition from the theoretical to the applied, or from *thinking* green criminology to *doing* green criminology. I use the theoretical model of the cogs of climate change in two ways. First, I engage with two of the cogs in the wheels of climate change—crimes that contribute to climate change and responses to climate change—by analysing the social dynamics that fuel the contributions that the Río Negro Basin region makes to climate change, and by identifying which local traditional practices of the region can be expanded and used to curb climate change. Second, I develop this analysis while remaining attentive to contextual particularities and basing the analysis on the epistemological power of the inhabitants of the region. In the next section, I describe how the research team conducted its study. A caution is due before proceeding. Be it a southern criminology or a criminology inspired by the epistemologies of the south that is used to study climate change, the knowledge produced in such an endeavour will always be partial because it engages a phenomenon—climate change—that is global in nature. Therefore, the main task of such scholarship is to highlight and expand knowledge about climate change produced in the geographical and metaphorical south and connect it with knowledge produced in other regions, creating a global repertoire of knowledge to address the global dilemma of climate change. This is not only a coherent response to the double nature of climate change as a glocal phenomenon (see e.g., Gupta, van der Leeuw and de Moel 2007), it also goes hand-in-hand with the common agenda of southern criminology and a criminology inspired by the epistemologies of the south, that of levelling the current imbalance in the production of knowledge.

Methods

This article is the outcome of a four-year interdisciplinary research project. Professionals from nine disciplines and seven academic institutions participated in the project: 1) The sociology research group Territorio from the Pontificia Universidad Bolivariana of Medellín, Colombia (UPB-Grupo de Investigación Territorio, 2016a, 2016b, 2016c); 2) Biology and ecology research groups from the Rosario University of Colombia (Universidad del Rosario 2015); 3) The biology and botany research centre Ecotrópico (2015); 4) The biotechnology research group Biotecnología Ambiental from the National University of Colombia (Grupo de Biotecnología Ambiental 2015a); 5) The Faculty of Veterinary Science of the Antonio Nariño University (Cruz Uribe 2017); 6) The CIF, which relied on the tools provided by physics and biotechnology (Centro Internacional de Física 2015); and 7) The law and criminology research group that I lead.

Interestingly, the research team decided to use the Río Negro Basin as the organising referent for the study. This was a breakthrough in the methodology used within green criminology, as this subdiscipline is usually concerned with how humans negatively shape nature. However, green criminology has failed to recognise that nature shapes human society more than human society shapes nature. Additionally, a basin is an ideal organising reference. First, because its geographical limits are stable, and second, because a basin is simultaneously a biophysical system with specific climatic and ecological characteristics, an economic subsystem that enables diverse

forms of production, and a social subsystem that integrates the communities located around it (Ministerio de Ambiente y Desarrollo Sostenible 2014). Using the basin as the organising referent meant that the project encompassed five Colombian municipalities: Caparrapí, Guaduas, Puerto Salgar, Quebrada Negra and Utica. The population of each of these municipalities varies between 5,000 and 17,000 inhabitants.¹ Several research groups coordinated by the CIF, including the one I led, conducted a set of multidisciplinary research subprojects between June 2014 and June 2018 on which this article is based. The application of ethics protocols was integral to the whole project. The ethics committees of the four universities involved each authorised their respective subproject. Additionally, the project and its goals were discussed with governmental authorities, businesspeople and inhabitants of the region before any data were collected. All actors involved authorised its development through official communications or informed consent. Moreover, the research team invited the inhabitants of the region to participate actively in the development of the project. As a result, there was ongoing communication between the researchers and the inhabitants of the region about the research methods and findings.

The Río Negro Basin and its Surrounding Eco-Social Systems

The Río Negro Basin is part of the larger hydrographic basin of Río Magdalena and is in the northern part of the Department of Cundinamarca. Five municipalities (Caparrapí, Guaduas, Puerto Salgar, Quebrada Negra and Utica) were settled around the Río Negro Basin beginning in the 1850s, with coffee as the main reason people migrated to the region (UPB-Grupo de Investigación Territorio 2016b). The biophysical characteristics of the Río Negro Basin region indicate that its current environmental conditions are inadequate for it to contribute positively to the mitigation of climate change, making the region ill-prepared to adapt to climate change. First, the landscape comprises the Andean Eastern range of mountains and valleys. Consequently, the areas surrounding the basin are mainly high slopes with intense tectonic activity, which creates a high landslide risk. Second, the region cannot function as a carbon sink because it has very little mature forest, which has the greatest capacity to store biomass; it is able to store 25 times more biomass than coffee plants (Universidad del Rosario 2015). Instead, a large percentage of the region is agricultural land (43.85 per cent), and a significant percentage of the natural areas (53.15 per cent) are composed of secondary vegetation (14.54 per cent)—that is, natural regrowth of previously cleared land. Third, the low ecological integrity of the region is an indicator of the decreasing richness, complexity and stability of the biotic equilibrium (Ecotrópico 2015). The area comprises 7,000 isolated patches, which means that the natural zones have a low ecological integrity. This depletes the soil of minerals, thereby affecting agricultural activities and making the soil unstable and prone to landslides. These environmental conditions are, moreover, in permanent flux because of human activity, which increases the risks posed by climate change, makes adaptation to climate change more difficult and intensifies the region's contribution to climate change. Most of these changes are the result of economic activities in the area.

The inhabitants rely on coffee and sugarcane production and animal husbandry. Coffee growing is the most important economic activity in the area but it is currently a key contributor to climate change and environmental degradation. Peasants struggle to crop *Arábica Castillo*, the variety of coffee most widely used, during dry periods because it requires extensive irrigation. They also remove the trees present on the coffee farms because this variety needs full sun. The second-largest economic activity in the region is sugarcane production, which also negatively affects the environment. Deforestation is accelerated because sugarcane crops require, according to some scientists, high light interception to increase productivity (see e.g., Bezuidenhout, O'Leary, Singels and Bajic 2003). Soil exhaustion is brought on by the sugarcane monoculture, and river banks are left unprotected because natural vegetation has been removed to make way for sugarcane crops, all of which increases the risk of floods (Centro Internacional de Física 2015).

Animal husbandry (dairy and beef) is only the third-most important agricultural activity in the region. However, most of the agricultural land is in the hands of a few landowners who use it for

their herds, even as they deem crop production undignified agricultural work compared to animal husbandry (a topic I will expand on in the next section). The average farm size of most peasants (94.4 per cent of landowners) is 31 hectares, with a maximum of 30 cows. Meanwhile, 5.3 per cent of landowners have farms of over 301 hectares and more than 121 cows. According to Erazo (2017a, 2017b), animal husbandry, by fuelling deforestation, results in the fragmentation of the ecosystem and the reduction of the natural areas. Further, animal husbandry 'has caused ... soil degradation, loss of biodiversity due to the reduction of wild species and the exhaustion of water due to deforesting practices ... thereby causing problems like landslides, erosion, among others' (Cruz Uribe 2017, 259). Animal husbandry also results in the deterioration of the water of the Basin via the shedding of residual waters without proper treatment.²

So far, I have presented the biophysical and economic nature of the region, which is a necessary element for the criminological study of the localised effects of climate change, but not the main component of the present criminological study. Rather, the focus is on the sociological causes of the human behaviour that fuels these destructive dynamics, which corresponds to the first cog in the wheels of climate change.

The Three Main Creators of Harm and Risk

In this section, using a genealogical study, I argue that there are three main structural factors that affect how the Río Negro Basin region contributes to climate change: First, cultural ideas about dignified and undignified work imposed by the colonisers; second, production practices imposed by the West; and third, market demands. The UPB Territorio research group (2016a, 2016b, 2016c) identified three historical phases from the settling of the municipalities up until the present of how the inhabitants of the Río Negro Basin region have related to the environment. I rely on these historical phases to contextualise the three main factors of environmental harm and risk in the region. Each of the factors appears in each phase.

Phase I (1850–1950), Settling and Adapting: The Imposition of Western Cultural Ideas About Dignified and Undignified Work

All three agricultural productive practices of the region were already present in the mid-nineteenth century. However, they were developed in quite different ways. Sugarcane production followed traditional methods of cropping and was developed by and in the hands of peasants. Coffee production was industrialised from the outset and controlled by the coffee industry. However, it still relied on mosaic cropping that combined subsistence crops with coffee. Animal husbandry was developed by a few rich landowners and caused most of the expansion of the agricultural area in the region. Sugarcane and coffee crops yielded the greatest social revenues (benefitting most of the region's inhabitants) with the lowest environmental impact because environmentally sound practices were used. It was animal husbandry that increased most rapidly, taking up large portions of land and destroying mature forests. However, it was considered the ideal productive practice in the eyes of the population of the region, an assessment that is still held to (Cruz Uribe 2017).

While most environmental harms are linked to the capitalist treadmill of production (Stretesky, Long and Lynch 2014), the dominance of animal husbandry and the environmental degradation it produced in the Río Negro Basin has cultural roots. Yepes (2001) documents how the Spaniards brought with them a 'cattle culture' (20), the essence of which was the rejection of certain kinds of physical work, such as the manual labour involved in cropping considered to be servile and undignified. Therefore, cropping was relegated to Indigenous populations and African slaves, while animal husbandry was the domain of the colonisers. Animal husbandry was consolidated as a noble activity: that is, dignified work, symbolic of the superiority of the cattle owners (Yepes 2001). These cultural representations determined the rapid increase of pastureland (Kalmanovitz 1982), disregarding its deleterious environmental effects. The argument that the

prevalence of animal husbandry is due to cultural and not economic reasons is substantiated by its low economic productivity. Neither in the beginning of the nineteenth century nor now has animal husbandry been a particularly productive activity (UPB-Grupo de Investigación Territorio 2016b). For instance, Cruz Uribe's (2017) study shows that animal husbandry has a low level of adaptability (58 per cent), self-sufficiency (61 per cent) and stability (64 per cent). Not surprisingly, the social equity derived from this activity also showed the low score of 63 per cent.

Phase II (1950–1990), Ruptured Ways of Habitation: The Imposition of Western Production Practices

This second phase was characterised by the generalised implementation of agricultural production methods brought about by the green revolution. The pillar of the green revolution was increased productivity to save the world from famine. Economic growth was established as the main goal of agricultural production. Consequently, the use of monocultures was revitalised, traditional knowledge was combined with technical knowledge to achieve the goals of the green revolution (UPB-Grupo de Investigación Territorio 2016b), and environmental concerns gave way to economic mandates. Unproductive elements like trees and undergrowth were removed by efficient chemical means, opening space to productive elements like monoculture crops of coffee and sugarcane. As they were grounded in Western science, green revolution practices were established as the means of ultimate agricultural production. However, paradoxically, the green revolution brought about the 'deterioration of the edaphic and hydric resources, the loss of biodiversity and the disappearing of the traditional practices of production' (Cruz Uribe 2017, 67). This second phase left in the collective imaginary, however, the belief that monocultures were the ultimate form of agriculture.

Phase III (1990–present), Territorial Unsustainability: Market Demands

Gustavo Wilches-Chaux (2009) defined territorial security/sustainability as the capacity of a territory to offer its inhabitants the stability necessary for them to develop their capacities, and offer its ecosystems the stability necessary to sustain their integrity and biodiversity. Territorial sustainability is then a double way in which human wellbeing goes hand-in-hand with the wellbeing of the ecosystems. Conversely, territorial unsustainability is the inability of the human population to fulfil its need on a territory and the simultaneous degradation of the ecosystems of that territory. Since 1990, most subsistence crops have been replaced by products demanded by the market (mainly coffee), thereby producing food insecurity and the degradation of the territory. To increase the reach of the cropland, and hence increase productivity, trees have been removed to make way for new coffee varieties that need full sun. Thus, the third phase marks the prioritisation of market mandates over environmental concerns and social needs. The consequence of territorial unsustainability has been the displacement of inhabitants to urban areas to ensure survival. Indeed, the combination of land monopolisation by a few landowners that began in phase I, the soil and water degradation that began in phase II, and the food insecurity of the third phase, have led to territorial unsustainability—the conditions necessary for human communities and ecosystems to secure their wellbeing and development are no longer present.

Back to the South?

Heretofore I have identified Western cultural, productive and scientific logics as well as market demands as the structural factors that brought about most of the environmental degradation of and the consequential climate change in the Río Negro Basin region. In this section, engaging with the fifth criminological cog in the wheels of climate change, I discuss how the region can develop constructive responses to climate change based on the epistemologies of the south. To illustrate the contribution that epistemologies of the south can make to the criminological study of climate change, I use Escobar's (2011) three (non-exclusive) roads as a typology for responses to climate change. The *conventional road* is the dominant response. Global markets and international cooperation are trusted with finding answers to the climatic crisis. This road is exemplified by

the commitments arrived at in the International Law of Climate Change, which rely on market tools to reduce carbon emissions (Bodansky, Brunnee and Rajamani 2017; Carlarne, Gray and Tarasofsky 2016). The second path is the *collapse and fortress road*, on which climate change is viewed as an issue of national security and where responses to it take the form of climate apartheid; fortresses are created for the privileged and the marginalised are left unprotected. This is the path down which the world is headed after having tried the conventional road, as Brisman et al. (2018) show. Both the conventional and the collapse and fortress roads have failed to mitigate climate change because, as stated by McClanahan and Brisman (2015), these responses declare 'war on climate change' as an issue of national security, which only furthers the problem. Instead, Escobar (2011) proposes a peace-making approach that is substantially different from any conventional legal efforts.

While orthodox criminology usually follows the conventional road, and southern criminology warns against the dangers of the collapse and fortress road, a criminology inspired by the epistemologies of the south provides alternatives for a third scenario, which is the set of paths that can provide a *road of transition*. This third road follows alternative complex ways of developing socio-natural interacting systems. A way criminology can trace the discourses of transition in the search for alternative responses to climate change is through the use of *development ethnography* (Escobar 2011). This is an ethnography that seeks to shed light on how the knowledge held and produced by the metaphorical south can be used in social policy to minimise the harms created, for example, by climate change. By applying a development ethnography in the Río Negro Basin region, the usefulness of agroecology and agroforestry systems to alleviate the harms produced by production methods and cultural ideas imposed by the West became evident. In their current versions, agroecology and agroforestry combine traditional, experimental and scientific knowledge. Agroecology is the 'science that develops a holistic study of the complex network of relations that can take place between all the organisms that integrate an ecosystem, which are mediated by a physical and cultural specific context' (Centro Internacional de Física 2015, 31). Agroforestry is an ancient method of production used in the Global South (Africa, America and Asia) whose simple logic is the combination of animals, pastures and trees (Geilfus 1994). Trees in the fields and pastures provide many economic, environmental and social benefits. In addition, the Grupo de Biotecnología Ambiental (2015a, 2015b) found that 'trees are basic and strategic to generate measures of adaptation to climate change' (2015b, 15). Regarding the ecosystems' wellbeing, the measures implemented by agroecology (mainly the inclusion of trees among crops) increase the fertility of the soil, are a natural method of controlling infestations, increase biological diversity, work as a carbon sink, function as a living fence to prevent soil erosion, and protect the hydric sources by helping maintain the humidity in the region. The inclusion of trees on farms also provides shade for the cattle. In socio-economic terms, the presence of trees on farms becomes a source of wood to produce furniture; allows for subsistence trees, like plane trees, in and among commercial crops; and provides continuity to cultural traditions that strengthen the social fabric, such as the use of local trees, for example, guásimo (*Guazuma ulminifolia*), in local festivities. Additionally, agroecological practices result in increased revenues; including 70 trees in a hectare of coffee crop increases production by 159 per cent (Erazo 2017a).

Conclusion

As climate change is a glocal phenomenon, responses must be globally oriented, while also paying attention to the local contexts. To find answers to climate change, it is imperative to identify its causes. In this article, I have shown that the three main harmful dynamics that contribute to climate change in the Río Negro Basin region are cultural ideas and production practices imposed by the colonial West, and market demands. Based on these findings, I proposed the use of agroecological practices as a more-than-adequate response to climate change. There are two important notions related to agroecology and agroforestry as preferred responses to the climate change crisis. The first is *progress parabola*, the idea that it was initially Western science in the

form of the green revolution that could save the world from starvation and help in the 'development' of 'third world countries' by imposing a 'perfect order' (Lansing 2012) and total control of the environment. Western science assumed this role of saviour, backed by its undeniable achievements in medicine and technology. Regrettably, it did so by undermining the epistemic power of non-Western scientific knowledge. However, because Western science failed to recognise the complexity and interrelatedness of nature, the green revolution resulted in the near destruction of the environment, brought on by the deforestation and reduction of biodiversity that it promoted. The green revolution also led to a humanitarian crisis, as many communities no longer had a natural environment to rely on. Paradoxically, this global development initiative almost destroyed the possibility of having a future to develop by compromising the planet on which we rely. Ironically, with a reverse progress parabola effect, Western science again relied on the very societies it had classified as undeveloped, hoping to find knowledge in them on how to save the Earth from environmental destruction and secure a future to 'develop'.

The second notion is the connection between agroecology and agroforestry, and a southern criminology. The green revolution sought to impose a predetermined technique of production that disregarded the contextual conditions (Borlaug 1968), much like orthodox criminology, that is, law enforcing, tries to portray its knowledge as universal and a-contextual (Aas 2012). Both projects have had deleterious consequences (see e.g., Morrison 2006 for the harmful consequences of orthodox colonial criminologies). Meanwhile, agroecology calls for a study of agricultural modes of production read in the framework of the particular physical and cultural context in which they are located, much like southern criminology does (Carrington et al. 2016) in its search for democratic ways of redressing the harms of colonial criminology.

Correspondence: David Rodríguez Goyes, Associate Professor at the Universidad Antonio Nariño, Colombia; and post-doctoral researcher at the University of Oslo, Norway. Kristians Augustus gate 17, 0164, Oslo, Norway. Email: d.r.goyes@jus.uio.no.

¹ I provide more information about these municipalities in the article.

² Other processes are also rapidly transforming the biophysical and social landscapes of the region. The building of 'The Sun Road', a mega roadway 1,071 km long, will connect the centre of the country with the Caribbean Sea, bringing a new wave of tourism in the region.

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