The More Things Change, the More Things Stay the Same

An Historical Ecology of Cattle Ranching and Associated Land-Use in Western Nicaragua

Daniel Edmond O'Toole

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Centre for Development and the Environment

University of Oslo, Blindern, Norway

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1. Introduction

Cattle ranching has been an integral part of the local and export economy in Nicaragua since the first permanent Spanish settlers of the early 16th century. It has at some points been more economically viable than others, due to internal and external market forces, political fluctuations, and socio-historical changes in land-use practices (Nygren 1995: 10). In the modern era, cattle ranching in Nicaragua has become a principle economic activity for a number of reasons, with the result that as much as 30% of the country's forested lands have been converted to pasture for grazing (Nielsen 1993: 34, Roebeling 2003: 7). The deforestation attendant with modern cattle ranching in Nicaragua has caused soil erosion and perceived land degradation. This has produced a considerable amount of academic literature that depicts cattle ranchers large and small as either greedy or ignorant antagonists in a discourse narrative that pits them against western 'scientific' conservationists as the enlightened interventionists (Jones 1990, Nielsen 1993: 36). This style of discourse narrative represents rural Nicaraguans as in need of intervention, but at the same time as incapable of independently utilizing the funds of intervention (cf. Fairhead & Leach 1996: 21). However, as stated by the Nicaraguan farmer Chepe Chu, "Peasants are not stupid, as many town people in Nicaragua would like to believe (Nielsen 1993: 20)." Methods of grazing cattle within forested lands are as old as the domestication of the auroch itself (Bogaard 2004), and as new as the wave of interventionism that has flooded the countryside since the 1990s. So have ranchers in Nicaragua, today or in the past, knowingly adopted practices that contribute to deforestation or perceived land degradation? Are motives purely financial, or are there other significant drivers at work in retaining possession of agricultural lands? Are trees undervalued economically; are cattle overvalued? How have land-use practices changed over time in response to historical socioeconomic and environmental

concerns? These are the questions I aim to explore in greater depth by investigating the land-use history of cattle ranching in western Nicaragua.

Nicaragua is a vivid example of a country where social, economic, and political structures have experienced rapid, oftentimes pronounced, change throughout its history, and particularly within the past 35 years (Walker 1991). Nicaragua became the focus of much academic attention following the overthrow of the U.S.-backed Somoza dictatorship by the Sandinista Front of National Liberation (FSLN) in 1979 (Walker 1991). Much of this academic attention has been in the field of political science, but in the words of Evelyne Huber, "To understand the political outcomes it is essential to look at the social setting, the class structure, and class relations, in which economic growth as well as the cultural and institutional heritage are embedded (1995: 4)." Therefore a considerable amount of research has also been dedicated to social causes of deforestation and land degradation, in particular as a result of the expansion of cattle ranching. One oft-quoted, but disputed, theory is that of the "hamburger connection," which links growth in the United States' fast-food industry with growth in beef exports from Central America (Edelman 1995). This theory is in keeping with a larger-scale academic trend to view 20th-century Central American history as a byproduct of U.S. geopolitical, market-oriented interventions (Painter 1995: 10). Another theory posits social inequity within a hierarchically classed society as the root cause of environmental degradation in Nicaragua (Painter 1995). Yet another theory controversially contends by means of a positivistic line of reasoning that Nicaraguan culture is the cause of environmental degradation, among other perceived socio-economic problems (Harrison & Huntington 2000). Despite their differing viewpoints, what these theories have in common is that they treat economic and environmental ramifications of cattle ranching in Nicaragua as an almost strictly post-World-War-II phenomenon, a fact that would seem to represent a gap in research (cf. Van Ausdal 2009).

Much academic literature has also been devoted to the ecological processes of present-day land degradation in Latin America; but ecological processes in general, I contest, should not be separated from their human dimension. Cattle ranching is a productive activity with environmental consequences and implications for consumption. As such, I find it relevant to apply Painter's rationale against treating technical aspects of production as isolated "without considering the historical issue of how a production system came to be," in order to avoid producing "information that may be manipulated in various ways to the detriment of the politically weakest people with an interest in an area (1995: 5)." Ainsworth concluded that cow productivity, both in terms of milk and beef, decreases relative to the greater the amount of pasture shade available, a potential incentive for deforestation, but he also acknowledges that this correlation may be the result of past "land management decisions (2010: 30)," and not necessarily of a purely biological nature. Hence a land management history of the region in question has the potential not only to elucidate often overlooked aspects of the human dimension of environmental degradation v. conservation, but also to connect local land management decisions with larger-scale transformative processes in an attempt to uncover certain "thresholds of change (Wilhite et al. 2000: 120)" that may have informed land-use decisions up to the present day, and that may also have implications for the structuring of future investment in the region.

According to Peter C. Roebeling, "Over 40% of global deforestation since the 1960s occurred in the tropics of Latin America. Pasture for beef cattle ranching was the most common replacement for these cleared tropical forest areas (2003: 7)." Within this same time period, deforestation as a cause of CO_2 emissions has become an issue of global import. Degradation of the atmospheric ability to absorb greenhouse gases is an issue that affects more than just a local population's means and methods of livelihood. The neotropics are where much of the earth's intact forests remain, and where arguably they are some of the most endangered forests as well. Deforestation in Nicaragua

has been a commonly utilized land-use practice, but this has not occurred in a geographical or historical vacuum. Global processes, and within the past decade, international sources of funding, have contributed to local land-use policies and decisions. At the same time, the actors within those global processes and the recipients of those international sources of funding have not acted in a passive manner, but rather "process information and strategise in their dealings with various [other] local actors as well as with outside institutions and personnel (Long 2001: 13)." For a long time now, it has been simply not enough to fall back on a discourse narrative that villainizes local, oftentimes pre-industrial, knowledge. In the words of Henri Bergson, "The present drains the past to irrigate the future (Marquardt 1994: 203)."

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This thesis will be organized into five main sections. The introduction in which the reader presently finds her/himself, is split into three chapters, and presents the central problem statement, the theoretical concepts around which the work is built, the author's methodology in the field and in print, a list of contributions from professional organizations and individuals, and a description of the geophysical setting in which the main body of the work will take place. 'Part I: Invasion' starts with Chapter 4, and begins the historical narrative of cattle ranching in western Nicaragua with the initial introduction of cattle to the western hemisphere by Spanish conquistadors. Social and environmental ramifications of this event in the pre-colonial and colonial eras will be analyzed within three subsequent chapters, and will be followed by a summary. 'Part II: Independence' begins with Chapter 7, and continues the historical narrative into the new political and military dimensions of the postcolonial era and the initial stirrings of 20th-century globalization. This part is divided into five chapters, concluded by a summary. 'Part III: Intervention' begins with Chapter 12, and brings the historical narrative through the social and environmental ramifications of 20th-century land-use up to the modern era, with implications for the future of agriculture in Nicaragua. This part is

divided into five chapters, and concluded by a summary. ‘Part IV: Innovation’ begins with Chapter 17, an ethnographic sketch of the present-day state of agriculture in the locations in which fieldwork was conducted: Muy Muy in the Central Highlands and Belén on the Rivas isthmus. This chapter includes commentary in the form of quotations from the producers and other stakeholders themselves, and concludes with a discussion of how the two locations of fieldwork differ in terms of land-use both in an historical context and in the present day. Chapter 18 is a conclusion proper, summarizing the entirety of the historical narrative into salient ‘thresholds of change’ and proposing causal sources for the present-day state of environmental degradation in western Nicaragua.

2. Arguments, concepts, sources, and methods

"It is an old idea that the more pointedly
and logically we formulate a thesis,
the more irresistibly it cries out for its antithesis."

-Hermann Hesse, 1943

As stated so eloquently above, every well formulated thesis that seeks to persuade a reader to adopt a certain conclusion inheres a well formulated antithesis that could potentially persuade the opposite through the selective use of an alternative set of data. This is just as applicable to Myer's 1981 *The Hamburger Connection*, which I aim to refute, as to my own present work. With this in mind, I would like to emphasize here the use of "An" in the title of this work, as opposed to "The." This work is not an exhaustive account of all things historical or of all things ecological. It is selective in terms of what has warranted concerted attention and even with what has warranted inclusion. As much as a writer may strive for non-biased exposition based on available contemporaneous sources, the writing of history is a subjective endeavor now as in the past, and therefore our sources themselves are also quite biased. With this in mind, it is often the task of the historian to be selective in terms of that which may or may not warrant inclusion, and this very act inheres an essential bias. What follows then regarding my conceptual framework is an ideal to which I will strive, with full knowledge that I as a writer will on occasion fall short of this ideal. Nevertheless, by work's end I hope that both I and the reader will have come to a better understanding and with a fuller knowledge of the subject matter and its implications. What I seek to present in the following work is neither thesis nor antithesis, but synthesis.

This work takes at its core an interdisciplinary approach to social science research. This is considered by the author essential to formulating a

holistic view of relevant concepts and theories, as "The study of human-environmental relations is complex and by nature draws on theories and practices from multiple disciplines (Doolittle 2008: 1)." Land management history is a topic that will by necessity incorporate practical and conceptual aspects of history, ecology, sociology, and ethnography. With this in mind, I will attempt not to be constrained by disciplinary strictures, but rather I will allow frameworks for interpretation to emerge from the data itself and not the other way around.

The conceptual focus of this work will align with the precepts of historical ecology, an interdisciplinary field of social analysis that emphasizes the holistic relationship between humans and the environment across space and time. Historical ecology takes as its point of departure the "historic landscape, a multidimensional physical entity... that has been modified by human activity such that human intentions and actions can be inferred (Balée & Erickson 2006: 4)." The term 'landscape' is emphasized in historical ecology, in lieu of the term 'ecosystem,' in order to point attention to the human dimension of ecological regimes (Balée 2006: 75). Disciplines, such as systems ecology theorize the succession of biotic communities as linear, ultimately approaching a stage of stasis referred to as the 'climax,' so long as linear progression is not disrupted by some form of disturbance (Cronon 1983: 10, Balée 2006). Almost inevitably, the source of this disturbance is human, essentially banishing humanity from the theoretical Garden of Eden and excluding human actions from the ideal ecological community (Cronon 1983: 10). Historical ecology, on the other hand, views ecological succession as more cyclical, disturbance as more natural, and historical change as the norm as opposed to the aberration to be avoided (Cronon 1983: 10, Balée 2006: 78).

In order to better comprehend historical change, the discipline of historical ecology tends to take the "long view of history (Balée 2006: 76)." This often results in analyses of pre-industrial societies with a view to reject the errant notions of the 'noble savage' and the 'pristine wilderness' (cf.

Cronon 1983: 11, Balée 1998, Balée 2006, Palacio Castañeda 2006: 19). One basic postulate of historical ecology is that all environments on Earth have been affected by human activity; that what we know of as the environment is at least in part an intentional human construct (Balée 1998, Balée 2006). To assume that pre-industrial societies were so dependent on the vicissitudes of nature as to in all cases be forced to adapt to its constraints is in itself a latent form of neo-colonialism, if not racism. It would seem more accurate to view human-environmental relations as mutually transformative over time. Though environment may shape the initial range of possibilities available to a particular human community, that community over time may reshape the environment in such a way as to open up a new range of possibilities with new implications for the livelihood of the community (Cronon 1983: 13). In the words of William Balée, "a relationship between nature and culture is conceived, in principle, as a dialogue, not a dichotomy (1998: 14)."

This line of reasoning introduces another basic postulate of historical ecology, that "kinds of societies defined by various socioeconomic, political, and cultural criteria impact landscapes in dissimilar ways (Balée 2006: 76)." One community's relationship with a particular environment will produce a landscape that is radically different from another community's in a different part of the world, or even sometimes in the next valley over. This will often have implications for the "historical trajectory of subsequent human sociopolitical and economic systems (or political economies) in the same regions (Balée 1998: 14)." For this reason, historical ecology seeks to critically analyze not just the evolution of ecological relations, but of sociopolitical relations as well, and the interface between the two (Cronon 1983: 13).

That historical ecology concerns itself with both pre-industrial societies and the evolution of subsequent sociopolitical systems is a long view of history indeed, and one not often encouraged within the research programs of academia generally. Fortunately, as a student of the Centre for Development and the Environment at the University of Oslo, I can tip a hat to the turn-of-

phrase of a seminal SUM researcher when I refer to this work as a ‘deep history’ (thank you Herr Næss). Indeed, I intend that no one historical era will receive disproportionately more or less emphasis and import than any others. At the same time, relevant historical information will not be relegated to that which has occurred before the modern era, but will integrate the present day as an historical reality that warrants treatment as such through application of the historical method (cf. Brondízio 2006). Though to take such a broad view of history may be open to criticism, how else would one arrive at a full picture of the present day without giving as much salience to the distant past as to the very moment?

An historical ecology approach has particular salience when applied to land management history since, among a large portion of the world’s population, collective decisions to shift traditional practices and livelihoods are made on the basis of “culturally transmitted information,” rather than on ‘expert’ opinions or a notion of a global commons (Crumley 1994: 6-7). If one can take for granted that there is a strong historic component to “culturally transmitted information,” then by inference “changing human attitudes toward the environment may also be identified and their effects studied (Crumley 1994: 6-7).” This has implications for policy-making, particularly because escalating deforestation in Nicaragua is at least in part an historic product of collective, rather than individualistic, decision-making.

Particular attention in this work will be paid to the role of human agency within the eco-historical narrative. In this way, the ancient Greek idea of *techne*, which is best defined as craft or skill, will be employed when speaking of technology, its linguistic derivative. This use of the term *techne* corresponds with Marglin’s (1990), as opposed to Scott’s use of the term *mētis* (1998: 313), though both refer to “a wide array of practical skills and acquired intelligence in responding to a constantly changing natural and human environment (Scott 1998: 313).” It is my opinion that linguistic usage of the term ‘technology,’ stretching back perhaps as far as Aristotle himself, has

attempted to usurp the term to apply strictly to those things produced through a deductive application of universal scientific principles. From its Latin root, though, the term *scientia* is best defined simply as knowledge. Knowledge in a general sense is the original meaning of the word 'science' in English as well up until the 19th century (González 2001: 22). Only in the wake of the European Enlightenment did the term 'science' come to "refer exclusively to the physical and experimental sciences (González 2001: 22)."

It is my opinion that knowledge in a general sense can be obtained as readily through experiential observation as through experimental observation. Knowledge in a general sense is often contextual, as opposed to universal, but in the case of rural agriculturalists, it is often based on exceptionally keen observations of the surrounding environment. These observations, sometimes amassed over the course of generations if not millennia, are often far more applicable to daily life than any conclusions garnered in the vacuum of an experiment. Though the term 'science' has long since been corralled into referring as much to a hegemonic power structure as to a form of knowledge in the general sense, still there exists the possibility of reclaiming the term 'technology' to refer to the systems used by rural agriculturalists, as well as those used by western-trained experimental scientists. In this way, I hope to put the two systems on a contextually equal footing, whereas terms such as 'traditional knowledge' or 'folk wisdom' implicitly characterize the former system as somehow pre-modern and inferior. Though the technological systems employed by rural agriculturalists in Nicaragua, as elsewhere, may be based on generations of accumulated knowledge, I believe that they do and should retain a very significant role in the modern world, even though that role is increasingly being undermined to the point of potential extinction.

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In summary, traditional histories, based on European Enlightenment notions of progressive human civilizations as increasingly separated from natural processes, often regard pre-industrial populations as beholden to the

limits of nature, that is until the dawn of 'civilization' in the modern sense of the term. At this point, the human-environment relationship is flipped entirely around, and 'civilized' populations are in turn viewed as the managers of nature, the only limit to which is the ingenuity of the human mind. In reality, nature is a far more active participant throughout the annals of history than it is often portrayed. In a similar vein, traditional ecology views a succession, or progress, of ecosystems toward a climax state, if left unadulterated by the activities of humans. Theories of environmental degradation tend to assume this degradation will occur as a result of adulteration by human activities (Fairhead & Leach 1996: 13), without acknowledging the causal role of human activities in the creation of a domesticated landscape. This study seeks to maintain the agency of both humans and nature through history, emphasizing a holistic relationship between the two characterized by fluidity and mutual transformation. This study also rejects the view of climax ecosystems as an end-goal of policy intervention, or other such machinations of 'systems ecology (Fairhead & Leach 1996: 9).' It is often this view that is used as a justification for the "imperatives of intervention (Fairhead & Leach 1996: 21)" that can potentially villainize local practices, in effect excluding those populations most in demand of acknowledgement, dignity, and respect.

At the same time, traditional histories are often beholden to chronological accounts that tend increasingly towards absolutes. One of these potential absolutes is the notion of continual progress; that over time history is approaching a perfection of the human condition through the application of increasingly advanced aspects of science and technology. Though out of vogue as a stated end-product of published historical accounts, the notion of continual progress can still be found in a myriad of academic and popular publications, as well as in the daily discourse of 'exceptionalism.' The contrary absolute to which environmental histories tend to lean is that of a degeneration over time, resulting in eventual breakdown of the human condition through flawed management of resources. Though neither approach is without some

contextual accuracy, they both represent examples of attempting to make absolute something that is very relative. As stated by Denis E. Cosgrove in 1998, “In all fields of learning, the past fifteen years have forced us to recognize that no single, coherent set of theories, concepts and methods—regardless of their moral or political appeal—can hope to provide a certain and progressive path towards truth (*xv*).” In the end, the only absolute when dealing with the interface of history, ecology, and sociology is relativism.

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This thesis will be developed within the framework of the research project “Bioengineering multifunctional silvopastoral landscapes: a case study in Nicaragua.” This project is a collaboration between the Norwegian Institute of Nature Research (NINA), the Centre for Development and the Environment at the University of Oslo (SUM-UiO), the Hedmark University College (HiH), and the Tropical Agricultural Research and Higher Education Center (CATIE), a regional organization with headquarters in Costa Rica and activities in all Central American countries. Through these institutions, I have received a certain level of logistical support, particularly in the case of CATIE. The general objective of this project is to understand and enhance the multi-functionality of livestock production landscapes in Nicaragua, and to support livelihood diversification and landscape functions. To date, this project has had a strong focus on biophysical and economic issues, but as participants in the project acknowledge, a more complete understanding of farm-level decision-making requires looking at the social dimension of livelihood choices. Biophysical, economic, or ecological studies alone cannot answer questions related to how people make decisions regarding land management or how their decisions today are constrained by decisions made in the past, whether by family members or politicians; or how the past history of land use and land management might restrict or support decisions made in the present or future.

After a period of extensive literature review of scholarly publications at the Georg Sverdrups Library at the University of Oslo, I arrived to Managua, Nicaragua, in September 2011. Here I continued literature review at the Nicaraguan National Archive and at the archive of the Historical Institute of the University of Central America. In keeping with the precepts of the historical method (Moses & Knutsen 2007: 117-118), I aimed to utilize as many first-hand sources as possible, for which the Historical Institute was extremely well suited. While in Managua, I also utilized the many resources of the National Institute of Territorial and Geographical Studies (INETER), particularly the technical archive, under the able direction of Denis Mayer, which housed a collection of aerial photographs dating back to the 1940s.

From Managua, I traveled to Muy Muy in the department of Matagalpa, an area that has been the recipient of extensive agricultural aid programs within the past ten years, from CATIE amongst other organizations. Utilizing connections already established by my faculty advisor Mariel Aguilar-Støen, I was able to recruit Julio Cesar Ordoñez as a field associate, and in this way to begin field interviews almost immediately upon arrival. These interviews were open-ended, informal, and conducted in Spanish, and, with the permission of the interviewees, recorded by a hand-held device for later review. For my own purposes, I sought to access information on how the use of the land has changed over time, including within the past few decades of international nongovernmental involvement. At the same time I wanted to allow the interviewees to dictate the flow of conversation as much as possible, to talk about what was most salient or most relevant to them in terms of their personal or familial histories. Where and when possible, I participated in the regular agricultural activities of my interviewees alongside them in order to gain greater insight into the cycle of local daily life. In this way, I sought to incorporate aspects of the ethnographic method into my fieldwork.

From Muy Muy, I moved on to León to visit the archives and library of the National Autonomous University of Nicaragua, then south to Belén on the

isthmus of Rivas, where CATIE has just recently concluded their research phase of a larger-scale agricultural aid project, built along the same parameters of their work in Muy Muy, but suited to local environmental and socioeconomic conditions. A number of studies by researchers from the Norwegian University of Life Sciences in Ås (Ainsworth, Hetland, et al.) have recently been conducted within this region, as well as studies by researchers directly affiliated with CATIE. For the most part the focus of this work has been on the biology of cattle or on the ecology of fodder plants within the study area. Ainsworth acknowledges the possibility in his study that an observed decrease in cow productivity relative to the amount of pasture shade available may be an indirect result of past "land management decisions (2010: 30)." With this in mind I sought to investigate the current rationale for land management decisions, particularly as it applies to woodlots within pastures. I also sought to uncover if this rationale had changed over time, and if these changes might correspond to any significant economic, social, or political fluctuations on a larger scale.

I collected data in Belén as I did in Muy Muy, engaging in participant observation and conducting informal interviews on an ongoing basis, in order to establish a comparative basis for my working assumptions. I was greatly aided in this work by employees of CATIE stationed at the time in Belén: Dalia M. Sanchez, René Quintanilla, Amalia Valencia, and José Barney Luna Reyes. Utilizing contacts established by these four, I interviewed the cattle ranchers themselves in order to gain insight into the subtleties of local practice and local perspectives on perceived biophysical degradation, and to potentially uncover a collective memory of past practices. This involved visiting the farms where land management decisions actually occur in order to gain familiarity with the ecological and social ramifications of cattle ranching in the study area. I also interviewed public servants working with policy initiatives within the study area in order to evaluate how the concept of degradation is understood by different interested actors. Qualitative data collected during

fieldwork was analyzed in conjunction with quantitative data gathered through primary-source research in order to formulate an interpretation of results according to "triangulation design (Creswell, Clark, & Garrett 2008: 68)." Muy Muy exhibits a different relationship to land use than Belén, but has been subject to many of the same larger scale economic, social, and political fluctuations. I intend to investigate if this different relationship to the land is the result of geography, landscape, access to resources, tradition, or a combination of multiple factors.

I then visited the campus and library of CATIE in Turrialba, Costa Rica, with one of the most extensive collections of agricultural journals I have ever encountered. In Turrialba, I was also able to interview some of the researchers who were integral in the conception and implementation of the agricultural programs that had taken place in Muy Muy and Belén. I returned to the United States in December 2011 to continue my research in the extensive archives and collections of the Bancroft Library of Berkeley University, the Library of Congress in Washington, D.C., the Rush Rhees Library of the University of Rochester, NY, and the Lamson Library of Plymouth State University in New Hampshire, not to mention the U.S.'s remarkably efficient and nationally integrated interlibrary loan system.

Primary and secondary sources utilized toward the construction of the historical narrative to follow were not relegated strictly to scholarly works, or even published works, but incorporated field interviews, oral histories, maps, photographs, legal documents, letters, and satellite imagery that can elucidate historic patterns of landscape use. I consider these sources as relevant to the construction of this historical ecology as any other published sources. In other words, the historical narrative to follow acknowledges its own nature as being constructed, but will attempt an accurate construction through the incorporation of diverse sources of information, including published as well as oral first-hand sources. By way of triangulation design, the data collected has informed the content and thematic pace of the narrative.

I hope that this work will also have implications for the discipline of historical ecology itself. While there is yet a paucity of environmental histories of Central America and Latin America in general, there are even fewer works that have attempted such an interdisciplinary analysis of a land-use practice so pervasive to Latin America as cattle ranching. There are fewer still that are set in rural Nicaragua. For these reasons, I hope that this work will prove a valuable reference to other scholars interested in how a land-use practice comes to be so pervasive in such a short amount of time over such a broad swath of a land. Ideally, historical ecology's 'long view' will enable me to produce a sort of 'deep history' that will introduce the geophysical nature of the study area, how humans have interacted with this nature over time, how large-scale historical events have conditioned local human-environment interactions, and how academic and popular literature has characterized this interaction over time. I conclude with a discussion that will tie my empirical data into an analysis of perceived 'thresholds of change.'

3. Tierra de lagos y volcanes

Nicaragua is known to many as the land of lakes and volcanos, and indeed these two geophysical characteristics of the country's landscape have done much to shape the land's natural and social fabric. Located at the subduction zone of the Caribbean tectonic plate and the relatively small Cocos tectonic plate, Central America in general is characterized by crustal instability and tectonic activity, manifested in the form of volcanism and earthquakes (Bundschuh and Alvarado 2007: 9). Nicaragua in particular contains a string of 28 active volcanos along its 290-kilometer backbone (Bundschuh and Alvarado 2007: 8). These volcanos are part of a larger chain called the Central American Volcanic Arc that extends from Guatemala to northern Panamá. Throughout Nicaragua's history, volcanic eruptions have done much to disrupt daily life, at times resulting in the relocation of cities and populations. But volcanic ash has also contributed considerably to the fertility of the soil throughout much of the Pacific coast of western Nicaragua. Apart from volcanic eruptions, earthquakes are also a relatively common occurrence, with hundreds of shocks taking place across the country each year (Gilbert 1994).

Along Nicaragua's backbone of volcanos are also located the two largest freshwater lakes of Central America, Lake Managua and Lake Nicaragua, which together constitute the Lacustrine Depression, a down-faulted sediment-filled structural trough, or graben (Bundschuh and Alvarado 2007: 8). Bordered to the west by the Pacific Ocean and to the east by the Caribbean Sea, with abundant water and high altitude volcanoes, Nicaragua attracts a variety of off-shore weather events, influenced by the proximity of the Pacific North Equatorial current, the Atlantic North Equatorial current, the Gulf Stream, El Niño, the northeast trade winds, and occasionally polar cold fronts from the north (Bundschuh and Alvarado 2007: 2-3). These weather events include hurricanes, tropical storms, extreme precipitation, floods, and droughts, which can have destructive effects on people, land, and crops,

particularly in coastal areas. These storms often hit land between July and October, which coincides with the rainy season in western Nicaragua.

Western Nicaragua is characterized by two distinct seasons, the wet season and the dry season, known locally as *verano* and *invierno*, summer and winter; though in fact actual temperature is more closely related to altitude than time of year. Though regional variations occur, the wet season generally sets in around May, with the arrival of the northern edge of the Equatorial low atmospheric pressure belts (Bundschuh and Alvarado 2007: 2). The dry season generally arrives in November, when subtropical high pressure belts return (Bundschuh and Alvarado 2007: 2-3). Agriculture can be and is practiced year-round, and annual rainfall totals generally decrease with distance from the oceans and generally increase with elevation, though the differentiation in terms of precipitation between the Caribbean lowlands, the Central Highlands, and the Pacific Coast is dramatic (Bundschuh and Alvarado 2007: 3-6).

The largest country in Central America, occupying 129,494 square kilometers, Nicaragua can be divided into three major ecological zones corresponding with the three regions named above (Gilbert 1994: 55). The Caribbean lowlands, the hot, humid region east of the Central Highlands known as *tierra caliente*, generally lies at less than 900 meters above sea level and occupies more than 50% of the national territory. It has been continuously occupied by indigenous populations that initially migrated from the humid tropics of South America, but this area was considered an insalubrious climate by the first European colonizers, and has since supported a relatively sparse population. Orographic cooling produces condensation throughout much of the area, resulting in approximately 4,000-6,500 mm rainfall per year and no dry season (Bundschuh and Alvarado 2007: 6). High temperatures and abundant rainfall lead to the rapid decay of organic matter in the soil, producing lateritic soil conditions, typical of tropical rainforests, that are not conducive to conventional agriculture except within the levees and floodplains of the river systems that drain the area (Gilbert 1994: 59, Bundschuh and Alvarado 2007:

8). Cassava (*Manihot esculenta*) is historically the principal crop of the region, but African palm (*Elaeis* spp.) has also been introduced in recent decades (Annis 1994: 130). Livestock are a present, but not omnipresent, part of the local economy as well.

The largest of the river systems to drain the Caribbean lowlands is the Río Grande de Matagalpa, with its source in the Department of Matagalpa in the Central Highlands. In fact, very few rivers with any significant hydrological capacity flow west to the Pacific from the Central Highlands, and those that do are short, steep, and often intermittent (Gilbert 1994: 56, Bundschuh and Alvarado 2007: 6). The Central Highlands are formed by the Isabelia mountain range which extends south from Guatemala and parallels the geologically younger volcanic axis, also known as Los Maribios mountain range. Known as *tierra templada*, the Central Highlands lie at an altitude between 900 and 1,800 meters above sea level, and exhibit a cooler climate than the lowlands to either side, due both to the higher altitude and distance from the coasts. The highlands do experience a dry season, though it is in many locales, such as the Department of Chontales, not as pronounced as the Pacific Coast with annual rainfall ranging between 1,400 and 1,800 mm annually (Municipio de Muy Muy 2006: 4). The study area of Muy Muy is located within this ecological zone. The climate is suitable for growing coffee in many portions of the highlands, and cattle can be found grazing pasture or being herded through the roads throughout the region. Some agricultural lands are dedicated entirely to growing silage for the dry season in the form of drought-resistant 'improved' grasses, mostly introduced from Africa. Other agricultural lands are devoted to the cultivation of 'basic grains' (primarily corn, beans, and the occasional squash) for local human consumption.

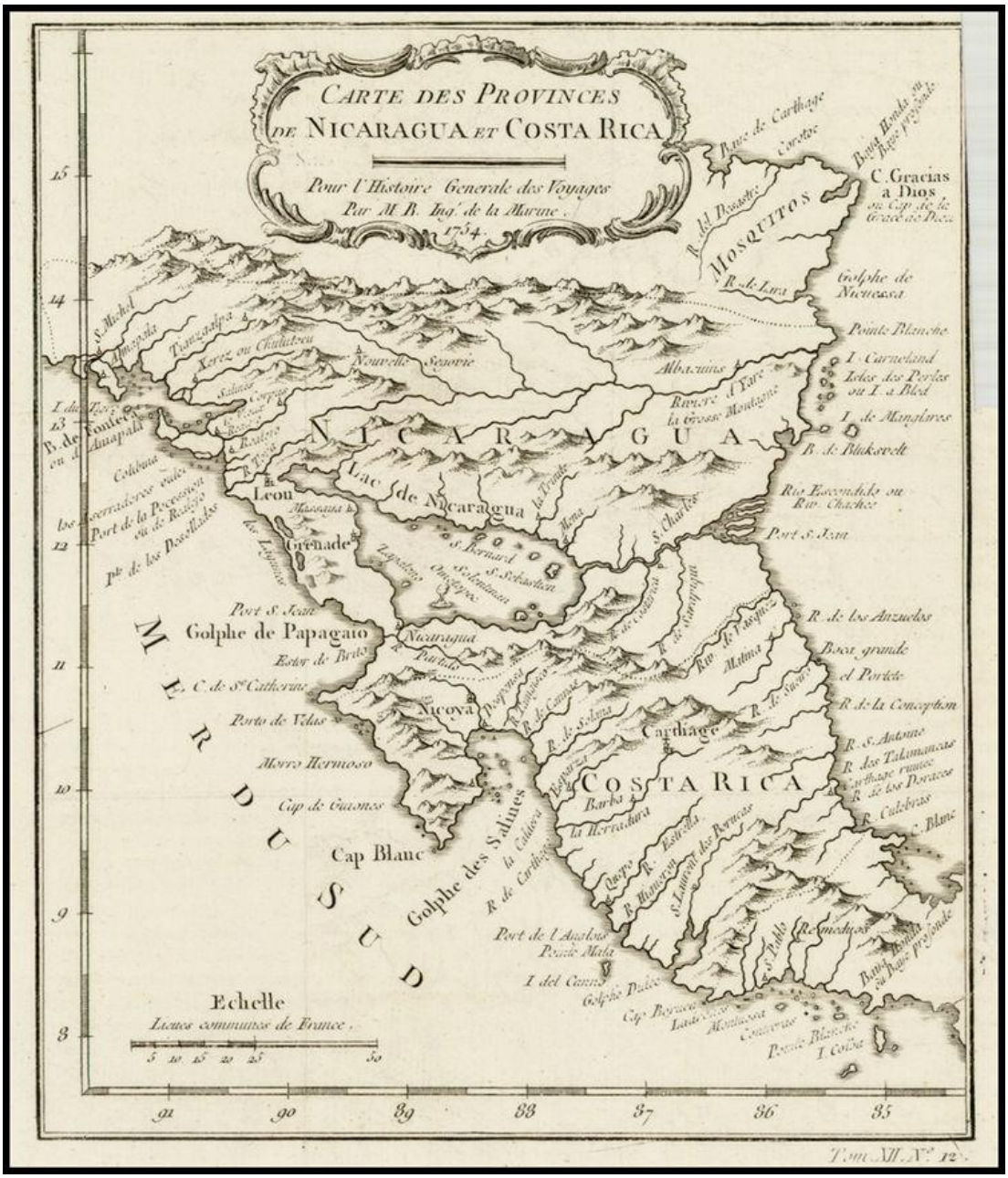
The *tierra caliente* of the Pacific Coast and the Lacustrine Depression is home to the majority of Nicaragua's population, today as it was at the time of the European invasion, despite that it extends only about 75 kilometers inland from the ocean (Gilbert 1994: 55). The dry season lasts a full six months in

this part of the country, meaning that fire, whether natural or anthropogenic, has played a large role in the natural history of the region, resulting for the most part in a landscape classified as tropical savannah, with an annual precipitation of approximately 1,500 mm (Municipio de Belén 2006: 3). The study area of Belén is located within this ecological zone. This ecoregion is predominantly characterized by Nicaragua's two large freshwater lakes, fertile lowland plains, and low-lying hills, markedly interspersed with a line of volcanoes that has enriched the soil with its ash for millennia. The agricultural output of the Pacific lowlands is more copious than other regions of Nicaragua, and more varied. Cattle are a very present part of the agricultural mosaic, but the primary cash crops are more often bananas, papaya, and cotton. What are considered the 'basic grains' of the Pacific lowlands incorporate not only corn and beans, but also rice, sorghum, and other regional specialties. Though not without its benefits in terms of agriculture, this region is prone to natural disaster, including volcanic eruptions, earthquakes, and floods and droughts in warmer El Niño years (Bundschuh and Alvarado 2007: 6). The infrastructure of the capital city of Managua itself has on two occasions in the twentieth century been brought to rubble, in 1931 and again in 1972 (Gilbert 1994: 56).

This scientific discussion of the geophysical properties and climate regimes that are known to affect the landmass contained within the political boundaries of Nicaragua has been presented first in order to introduce 'Nature' as an active, as opposed to passive, participant in the historical narrative to follow. The processes of nature (just as the processes of the human species that constitutes a portion of what I refer to as nature) contain agency to enact change on a large scale. These processes affect and are affected by various actors and actions of anthropogenic origins and of a purely ecological sort. Nicaragua is a geologically unstable country characterized by a long history of dramatic climatic events, including severe earthquakes, volcanic eruptions, delayed rainy seasons, overgenerous ones, floods, hurricanes, and tropical

storms. Natural disasters are frequent, as are the adaptive responses to them. Nature itself is not only a stakeholder in this narrative, but an agent of certain critical thresholds of change.

Part I: Invasion



1764 map of the provinces of Nicaragua and Costa Rica

by Jacques Nicolas Bellin

courtesy www.RareMaps.com – Barry Lawrence Ruderman Antique Maps Inc.

4. “El ganado multiplicó a la maravilla” (García Peláez 1943-1944: 173)

The first domesticated cattle were introduced into the boundaries of what is today Nicaragua not long after the arrival of the first Europeans to the Central American isthmus (García Peláez 1943-1944: 173, Newson 1987: 108). This represents an irrefutable and irreversible threshold of change with many and varied impactful repercussions in the centuries to come. Prior to the European invasion, the native inhabitants of western Nicaragua were in large part settled agriculturalists who subsisted primarily off of maize (*Zea mays*), beans (*Phaseolus* spp.), squash (*Cucurbita* spp.), cacao (*Theobroma cacao*), cassava (*Manihot* spp.), and other fruit and vegetable products (Radell 1969: 44-47, MacLeod 1973: 123). Tobacco (*Nicotiana tabacum*) and cotton (*Gossypium* spp.) were also important agricultural crops (Radell 1969: 46). At the time of arrival of the first Spaniards to western Nicaragua, there existed two major native ethnic identities, the nahuatl-speaking Niquirano of the Rivas isthmus and the Choroteganos of the Central Highlands and northern Pacific Coast (Radell 1969: 36-38, Brás 1994: 5). There existed a large diversity of smaller ethnic and linguistic groups as well, particularly in the Caribbean lowlands (Brás 1994: 5). Then as now, nevertheless, the great majority of Nicaragua’s population lived within trading distance of the Pacific Coast for a number of ecological, societal, and commercial reasons.

Politically well organized and militarily powerful, the Niquirano lived in towns with centrally located marketplaces and with hinterlands consisting of intensively cultivated fields that were collectively owned, but partitioned into family units (Radell 1969: 39-44, MacLeod 1973: 124). Each town also served as steward of communal stretches of woodlands, from which villagers could extract building materials, wild animals, dye, and cacao (MacLeod 1973: 222). The Niquiranos had a near-monopoly on the lucrative production of cacao in pre-conquest Nicaragua, an ostensible source of wealth as the seeds of this

plant were regarded as prestige items and were utilized as a form of currency throughout most of Central America (Radell 1969: 46-47, MacLeod 1973: 68-69). It was this very wealth that would attract the attention of the Spanish conquistadors, and would soon thereafter threaten this thriving human population with extinction.

Hearing of the Niquirano's wealth and political clout, in 1522 Spanish conquistador Gil González Dávila requested his guide to take him to the cacique of the Niquirano, whose seat of administrative and political power was situated near present-day Rivas on the shores of Lake Cocibolca, or what would come to be called Lake Nicaragua (Radell 1969: 56-57, CANTERA 2006: 74). Upon González's return to the Spanish colony in present-day Panamá, he reported to Governor Pedrarias Dávila the region's wealth, its large population of natives, and its potential water crossing via Nicaragua's large inland lake (Radell 1969: 59). Pedrarias almost immediately sent out the captain of his guard, Francisco Hernández de Córdoba, to claim the territory for Spain, which was summarily accomplished with the founding of Granada and León in 1524 (Radell 1969: 59). According to Bernal Díaz de Castillo, conquistador and chronicler of the conquests of Hernán Cortéz, cattle had been introduced into the territory of modern-day Honduras by 1525 (García Peláez 1943-1944: 173), and they were soon traded across the landmass until they "swarmed everywhere" in Nicaragua as well (MacLeod 1973: 48).

The early colonial economy of Nicaragua was one characterized by opportunism, to put it kindly, a feature which could be said to apply to the Nicaraguan export economy well into the 20th century. The first conquistadors were not interested in any kind of economic development, *per se*, but rather in get-rich-quick schemes that could earn them riches with little to no capital investment or built infrastructure (MacLeod 1973: 46). After a failed attempt to extract surface mineral resources from the mountainous north of the territory, the first European settlers of Nicaragua looked to exploit what had attracted them to the area in the first place, the large indigenous population

(Newson 1987: 108). A brisk trade in slaves commenced and soon intensified once Pedrarias Dávila became governor of Nicaragua in 1526 (Radell 1969: 68). Most of this human traffic was funnelled into Pedrarias' other territories in modern-day Panamá, and then a considerable portion of it further on to aid in the ongoing conquest of Perú, which also received its share of live Nicaraguan cattle (Radell 1969: 72, MacLeod 1973: 51-52, Abbass 1993: 166). Estimates can vary, but it is likely that the pre-conquest population of Nicaragua numbered at least 800,000 and perhaps more than one million (Radell 1969: 66, Newson 1987). The 16th-century priest and chronicler Fray Bartolomé de Las Casas claimed Nicaragua as "one of the best peopled countries in all America (Squier 1860: 276)." But by 1550, when the trade had finally slowed for lack of additional slaves to sell and subdued disapproval from the Spanish crown, Nicaragua's population may have numbered as little as 10,000 (Radell 1969: 79-80, MacLeod 1973: 53).

Though a remarkable figure to report, the immensity of this slave trade is corroborated by multiple first-hand accounts and early historical sources (Las Casas 1812, Herrera y Tordesillas 1946, Oviedo 1959). Colonial priests and monks, such as Las Casas, influenced early historians, such as 17th-century Antonio de Herrera y Tordesillas, who both wrote within a narrative discourse that emphasized the extreme cruelty of the conquistadors toward indigenous populations, particularly as it applied to the practice of slave trading. Other factors such as warfare and newly introduced diseases contributed to the rampant depopulation as well, but in the case of Nicaragua, it can be stated that the slave trade was the most prolific of the new territory's first industries (MacLeod 1973: 51).

The slave trade, the first large-scale get-rich-quick scheme of the conquistadors in Nicaragua, had been exhausted by 1550. Having effectively destroyed their supply of cheap agricultural labor, the earliest European settlers would ultimately have to turn to an economic activity that required very little manual labor, such as free-range cattle ranching, among other activities. The

transition did not happen overnight though, as merchants in Granada continued to wait for the next export 'boom.' Rather it could be stated that cattle in early colonial Nicaragua represented a kind of baseline economy that perpetuated itself without overt intervention, while Spanish entrepreneurs searched out other means of turning a profit through overseas export (MacLeod 1973: 48).

In addition to livestock imported from Honduras and the Caribbean, in 1527 Pedrarias also sent for shipments of basic foodstuffs from his territories further to the south, which included "stallions, mares, cattle, sheep, pigs, and 'other livestock' (Sequeira Arellano 1961: 30, Radell 1969: 148)." Unlike in the conquistadors' native Spain, where livestock lived in competition for space and food with a relatively dense and growing population of humans (Butzer 1988: 31, Abbass 1993: 186), cattle in the western hemisphere were given free rein to fill in all the agricultural lands now emptied of indigenous populations (MacLeod 1973, Butzer 1988). What is more, the native populations that remained "*generally distanced themselves from the proximity of the whites, ceding to the conquistadors the uncultivated savannahs that served as grass fodder for the cattle* (García Peláez 1943-1944: 34)."

It is today believed that the entirety of the Central American landmass, save a small portion of grassland in present-day Belize, contained forested lands prior to the arrival of humans (CATIE professional #1, Turrialba, 30/11/2011). Therefore whether the savannahs referenced above were cultivated by natives or not, it is safe to assert that they represent an anthropogenic landscape that was highly conducive to the rapid proliferation of livestock. These savannahs, in conjunction with village woodlots maintained by indigenous populations, likely contributed to pre-invasion biodiversity in general, as ecological border-zones between forest and field are often hotspots of species diversity. How these savannahs came to be may be akin to the process described by Thomas Belt, living on Nicaragua's agricultural frontier in the 1860s. He described local farmers clearing virgin rain forest to plant maize (Belt 1888). These plots were then abandoned within

a few years to be colonized by savannah grasses (Belt 1888). Once they were well established, these savannah grasses were utilized as fodder for livestock and maintained through the use of fire (Belt 1888).

The use of fire for purposes of landscape management was a widespread and common practice, wherever a dry season made it possible, for pre-invasion populations of Nicaragua (Jones 1990: 18). This practice even contributed to demographic distribution across Nicaragua, as the widespread use of fire to clear forests and create agricultural lands is only possible in landscapes with a dry season (Jones 1990: 18), namely the Central Highlands and the Pacific slopes and coast of western Nicaragua. This means that the humid eastern slopes and Caribbean lowlands of Nicaragua – which do not have a dry season, exhibit nutrient-deficient tropical soils, and are subject to pronounced crop damage by way of fungus and bacteria – have rarely ever been clear-cut and have never contained large populations of settled agriculturalists. So when early European colonists also chose to settle the Pacific regions of western Nicaragua, and to continue to utilize fire to manage their landscape, they were following a pattern that had been in place in Central America for millennia (Jones 1990: 18)

As a series of 16th-century agricultural export schemes, such as the short-lived cacao boom of mid-century, quickly dried up for lack of skilled labor and for loss of local ecological knowledge, more exhausted agricultural lands were opened up to be colonized by grass and livestock (MacLeod 1973: 77, 95). Though native grasses, such as the still ubiquitous *grama* (*Paspalum* spp.), were likely among those plants whose range expanded owing to the introduction of cattle to the western hemisphere, there were also a number of non-native species to flourish in the wake of livestock, such as Bermuda grass (*Cynodon dactylon*) and giant cane, or *caña* (*Arundo donax)*, among others (GISD 2010, GISD 2011). Some of these introduced plant species were carried intentionally by Spanish colonists for use as fodder, building materials, etc.; others were likely smuggled in as seeds on the hooves of cattle. Regardless of

their manner of introduction, these newly introduced plants and animals forever altered the genetic make-up of the Americas, and to an extent homogenized the biodiversity of the entire landmass. With no natural predators, save an occasional jaguar or venomous snake, cattle in particular multiplied quickly and abundantly in Nicaragua, but there were "*no sheep nor goats, as it is not land for them* (Ciudad Real 1873: 351)." This may be an overly simplistic explanation on the part of the 17th-century biographer Fray Antonio de Ciudad Real, but one indicative of a situation which for the most part persists to the present day. Fray Antonio de Remesal, also writing in the early 17th century, admitted that the herds of Central American livestock were not so much bred, as much as they simply multiplied on their own, owing to the fertility of the land and the quality of its abundant waters and grasses (1964: 271).

In 1551, the crown of Spain, in one of its nominal gestures of goodwill toward aboriginals, decreed that native Nicaraguans were free to raise livestock if they wished (Newson 1987: 180). Nevertheless, the indigenous population of Nicaragua at first treated these bulky, horned creatures with trepidation, and the early conquistadors chose not to tend to the growing herds at all, resulting in large groups of semi-feral cattle that readily ravaged local crops (MacLeod 1973: 126-128). With no prior precedent for the use or consumption of large draught animals, the commonly owned farmland of the native Nicaraguans was unfenced and open to invasion by livestock. Uncertain of how to combat this further threat to their subsistence, and perhaps frightened of the repercussions of attacking these animals that seemingly belonged to the conquistadors, many natives simply abandoned their farms, creating additional agricultural land to be usurped by livestock (MacLeod 1973: 127-128). Other indigenous groups were forced by Dominican and Franciscan missionaries into *congregaciones*, or densely packed settlements surrounding a central church, so that they could be more easily converted to Christianity, which also freed up additional lands for grazing (MacLeod 1973:

121-122). Still other natives were subjected to the encomienda system of forced labor as conquistadors continued to impinge on the livelihoods of Nicaragua's indigenous peoples. Such were the numbers of cattle and horses that ecclesiastical biographer Antonio de Remesal, writing in the early 17th century, had cause to complain that the livestock had "*made scarce the fields of herbs, wheat, and corn, and the trees of Spain, that had cost so much to bring, plant, and protect* (García Peláez 1943-1944: 173)."

The conquistadors for their part ate a fair share of beef *per capita*, but with meat and land so inexpensive and readily available, they chose not even to claim individual ownership on the animals, preferring rather to simply kill them as needed (MacLeod 1973: 128). This represents something of a break from the traditions of their native Spain, where a majority of cows were sedentary and utilized for dairy or the yoke (Butzer 1988: 43); but the practice of free-range cattle ranching was by no means unknown on the Iberian peninsula, in fact it may well have been born there (Bishko 1952).

The wild aurochs of prehistoric Europe are known to have occurred throughout the Iberian Peninsula (Rouse 1977: 10). The first domesticated cattle, with origins in Asia Minor, were likely brought in by the Celts around the 3rd century B.C.E., after which interbreeding of these two stocks produced the "peninsular bovine (Rouse 1977: 10)." As the all-purpose European domesticated cow relocated southward in the wake of the 11th-century *reconquista* of Spain from Islamic forces, it also interbred with the feral stock already grazing on Spain's central plains, producing a hybrid race unsuited for dairy or draught purposes, but prized for its meat and hide (Bishko 1952: 497-498). At the same time, the Iberian peninsula happened to be the one region in medieval Europe with domesticated horses enough in abundance so as to avoid them being monopolized by the aristocracy (Bishko 1952: 507). Hence some Iberian cattlemen of the 11th and 12th centuries were able to take to their horses to herd larger numbers of semi-feral cows on the open range, much of which was considered common pasturage (Bishko 1952: 494-495). By the 15th

century, cows and sheep had to compete with croplands and Spain's growing cities, yet still much of the grazing lands were in the public domain; hence herds were extremely mobile and ranges quite extensive in character (Bishko 1952: 512, Butzer 1988: 43). By way of comparison, the size of herds and the extent of range in Spain paled in comparison to that of the western hemisphere, but still the conquistadors – those who had any agricultural background – were well accustomed to a mixed land-use system that incorporated common pasturage (Butzer 1988: 37). Supplanted into 16th-century Nicaragua, with seemingly limitless land, only four rather small cities, croplands that were treated as expendable by the new arrivals, and minimal available labor, an extensive system of common, unrestrained, open pasture was a natural development as far as the conquistadors were concerned.

Left to their own devices, both the cattle and the men who would come to look over the Nicaraguan herds developed their own kinds of regional particularities. Traded in from Honduras, the Caribbean, and Panamá, Nicaraguan cattle from the start were of a mixed genetic provenience, but mostly deriving from the Iberian range breeds (Abbass 1993: 175). Accustomed to the open scrubland of the high plains of central Spain, these cows seem to have taken immediately to the vast anthropogenic savannahs of western Nicaragua, requiring neither additional clear-cutting of forested lands nor the intentional introduction of European grass species to become established. Still they were maladapted to tropical heat and humidity and a three-to-six-month dry season, hence these herds must have rapidly underwent a process of interbreeding and acclimatization (Valdivia Hidalgo 1968: 7). What resulted is the Nicaraguan criollo race, still dominant to this day, which is characterized by low productivity in terms of meat and milk, but a high capacity to survive adverse climatic conditions, such as heat, humidity, strong sun, and deep mud (Valdivia Hidalgo 1968: 7-8).

A new kind of cowherd was simultaneously acclimatizing to tropical conditions as well. As a new generation of mixed-blood adults were coming of

age, they were not accepted into the ranks of the Spanish elite, nor was the lure of servile labor in indigenous settlements very appealing; hence a life of vagrancy remained as a third practical option. Frowned upon by the authorities – *vago* is still a term of derision in Nicaragua – many of these transients were persuaded or outright forced into employment in the "cattle-dominated countryside (MacLeod 1973: 192)." These mestizo cowherds were to become highly skilled on horseback, donning characteristic leather uniforms of the trade, and they enjoyed a high level of individual freedom that was not easily attained in colonial Nicaragua (Radell 1969: 155; MacLeod 1973: 192). Despite the initial annual surplus of maize and other crops, there was no tradition of fodder storage for the dry season in Nicaragua, so the cowherds practiced a form of transhumance, not entirely unlike that found in late medieval Spain (Radell 1969: 150, Butzer 1988). At the onset of the dry season, a number of cows would be slaughtered lest they die of starvation, and the rest would be driven either to the marshy eastern shores of Lake Nicaragua, a region now known as Chontales, or toward the higher-altitude frontier of the Central Highlands, which was not so adversely affected by desiccation (Radell 1969: 149-150). To this day, eastern Chontales is still known as the premier area for grazing cattle in Nicaragua for its short dry season and its extensive man-made savannahs (Radell 1969: 151-152). To the merchants of Granada, though, Nicaragua's colonial economy was not yet one of subsistence, and export items were still actively sought after; so the immense cattle herds of Nicaragua were at first more prized for their hides than for their meat.

The colonial city of Granada, founded on the shores of Lake Nicaragua on the hopes that a water crossing to the Caribbean was to be found, was from its inception dependent on an export economy oriented toward the Caribbean and Spain. This dependence on trans-Atlantic trade was a crutch for the entirety of Central America, as so many of the isthmus' natural and demographic resources have been located on the Pacific side of the central mountain range since well before the time of conquest (MacLeod 1973: 387).

The route along the San Juan River, which connects Lake Nicaragua to the Caribbean, was not without its difficulties – rapids, sandbars, and pirates among them – leading to its occasional abandonment as a shipping route and making the transport of large or bulky goods, such as live cattle, a logistical impossibility (MacLeod 1973: 200). However there was a Spanish demand for hides and tallow (Bishko 1952: 514, Newson 1987: 145), as well as a local demand for use in the mining industry (Abbass 1993: 176). With more beef in the country than could be readily consumed, the mestizo cowherds took to hunting down the semi-feral cattle, stripping them of their hides and fat, procuring at most a day's ration of meat, and leaving the carcass for the vultures (MacLeod 1973: 212, Newson 1987: 145). Though the hunting-down of feral cattle by pike and knife has its precedents in peninsular Spain (Bishko 1952: 498-499), the abandonment of carcasses to spoil and rot seems to be a strictly colonial phenomenon. But such wasteful measures could not be upkept for long, as demographics and patterns of land use would shift and evolve into the next century.

5. “Somos productores de materia prima” (Don L. de Muy Muy, 6/10/2011)

Throughout the 16th century, additional Spanish immigrants continued to arrive to the Americas, as the era of the conquistadors gave way to an era of settlement and colonization, the next threshold of change. This early influx peaked between 1601 and 1625, when an average of 4,450 people set sail annually from peninsular Spain (Butzer 1988: 31). This figure does not sound enormous by modern standards, but represented a sizeable demographic considering the still declining native population and a Spanish-Nicaraguan population that did not exceed much more than 500 in the year 1600 (MacLeod 1973: 218). The new arrivals and those Spanish already living in Nicaragua increasingly took to the countryside in greater numbers as the trans-Atlantic export economy waned and foodstuffs became scarcer in the cities proper (MacLeod 1973: 219).

One factor of decreased foodstuffs in cities of the colonial Spanish realm was an overall turn-around in the abundance and cheapness of beef after 1570. A number of causal complaints for this situation have been posited, including the indiscriminate slaughter of animals, effects of overgrazing, a general lack of animal husbandry, an unorganized system of urban distribution, and the growing predilection for meat among native inhabitants of Central America (MacLeod 1973: 211, Newson 1987: 145, Abbass 1993: 185). For reasons that will be investigated, Nicaragua was not so much struck by this decline in the availability of beef as its neighbors. In 1576, one *real* in Nicaragua still procured 28 pounds of meat; in 1587, this figure rose to 39 pounds of meat; and in 1606 to 40 pounds per *real* (Sequeira Arellano 1961: 30), ostensible evidence of a still increasing herd size. By way of comparison, beef in Guatemala as of the 1620s was going for 27 pounds a *real* (Gage 1958: 184). Demand in the Audiencia of Guatemala ultimately promoted cattle ranching in Nicaragua from a background agricultural practice to one of the most

important economic activities in 17th-century Nicaragua (Radell 1969: 162-163, Newson 1987: 145), a position which it has held to a greater or lesser extent ever since.

Though by necessity cattle-ranching is an activity of the countryside, requiring a labor force residing in the countryside, the land-owning urban elites of Granada were quick to capitalize on their new position as meat suppliers of greater Central America. By 1608, there were a reported 80 ranches in the vicinity of Granada, each containing some 2,500 to 3,000 head of cattle (Newson 1987: 145), while ranches in peninsular Spain around the same time did not number more than 1,500 at most (Bishko 1952: 500). 17th-century writer Fray Antonio de Ciudad Real stated at that time that there existed "three kinds of people in Granada; encomenderos, merchants and traders, and cattle ranchers (1873: 363)." To place cattle ranchers on an equal footing as the first two professions, both of which were status-producing endeavors, was a new development for Central America, and may well represent the historical origins of Heckadon Moreno's "culture of pastures (Jones 1990: 14)." Heckadon Moreno (1981) posits the ubiquity of cattle ranching in present-day Central America not as a product of purely financial considerations, but as a byproduct of "the image of the cattle rancher as an aristocrat and a holder of high social status (Jones 1990: 14)." Regardless of their precise motivations, these initial Granadine cattle ranchers reinvested their earnings into expanded production in the areas of Managua, Masaya, the Carazo plateau, and the Rivas isthmus, making the lacustrine depression – or the region around the lakes – the site of Nicaragua's principal livestock herds of the 17th century (Radell 1969: 150).

These livestock herds, and those of colonial León, were thence driven overland to urban markets in neighboring Honduras, El Salvador, Costa Rica, and Guatemala (Radell 1969: 149). Up until the construction of Nicaragua's principal highways in the 1940s, overland drives remained the most common manner of bringing cattle to market; hence it was not uncommon for future

generations of ranchers from Belén to move their cows seasonally 125 kilometers to northern Costa Rica (CANTERA 2006), or for ranchers from Muy Muy to move their cattle as many as 150 kilometers to markets in Tipitapa or Masaya. In the colonial era, though, it was at great cost that cattle were driven some 800 kilometers north into Guatemala (Radell 1969: 149).

The Audiencia of Guatemala had been founded in 1544 to oversee administration of a landmass stretching from southern Mexico to Costa Rica, in other words much of present-day Central America (Brás 1994: 8). Santiago de Guatemala, present-day Antigua, was the seat of the Audiencia and Spanish Central America's most populous city in the 17th century (MacLeod 1973: 218). Thus when food scarcity was felt there around the turn of the 17th century, administrators sought various measures to secure a steady supply of meat, one of which was requiring neighboring regions, including the Nicaraguan territories of León and Nueva Segovia, to supply Santiago first and themselves second (MacLeod 1973: 214). In later centuries, this policy would apply to regions as distant as Nicoya in present-day Costa Rica (Newson 1987: 267). This mandate, among other import/export taxes and restrictions of what MacLeod has called "the great age of governmental interference in the economy (1973: 378)," served to foment regional hostilities and to exacerbate the fragility of an already loose confederation of states.

Cattle drivers were thus forced to weaken their herds in the course of the march to Guatemala, and in the end sell an inferior product at a lower rate than would have been available in Granada, owing to the monopoly of state buyers in Santiago (Newson 1987: 267). The death toll of cattle on the march made the journey highly inefficient and resulted in more overall losses in the Central American cattle stock. For a period in the late 18th century, it was illegal to sell healthy cattle on the way, so some farmers took to burning their grazing fields in an attempt to intentionally weaken herds so that they would be sold to them out of necessity (Newson 1987: 266). Regardless of the obvious disadvantages for the sellers, this overland drive continued on and off into the 19th century.

Though the earliest figures are not well known, it was reported in 1797 that of a total of 14,134 head of cattle sent that year to Guatemala, only 8,614 arrived on the hoof (Radell 1969: 157). The other 39% were either lost, dead, eaten, or sold on the way for provisions (Radell 1969: 157). This was not to be the final example in Nicaragua of a government interfering with the domestic market in order to ensure the success of the agroexport economy.

Though Nicaragua's nascent agricultural sector was by the turn of the 17th century on its way to establishing its basic commodities – cattle and corn – still the Granadine merchants lusted after an export product that would create another European 'boom.' A viable option was soon hit upon that would satisfy both sectors, but at the expense of the remaining forested lands of the dwindling indigenous population of western Nicaragua. That option was indigo (*Indigofera suffructiosa*), known to the Niquiranos of the 16th century as *xiquilite*. It was known to the Niquiranos because it had been selectively harvested for dye from wild stands found within forested woodlots for many generations (MacLeod 1973: 222). This combination of selective harvesting and preserved woodlands meant that 16th-century Nicaragua contained a considerable quantity of wild indigo, which was exploited to a small degree as of the 1570s, but mostly left to the natives to manage (MacLeod 1973: 178).

The gradual Spanish diaspora from Nicaragua's colonial cities, though, coincided with the success of the territory's early indigo exports. This meant that these same Spaniards sought out the highly fertile soils of the volcanic lowlands of the Rivas isthmus with the intent of turning indigo production into a plantation industry (MacLeod 1973: 178). Though at first relatively sensitive to the boundaries of indigenous property – after all it was still officially illegal to outright usurp indigenous land – colonizing Spaniards claimed seemingly unused, forested lands to establish their plantations (MacLeod 1973: 222-223). This seemingly unused, forested land in fact constituted the communal woodlots of the remaining indigenous villages, from which natives extracted much of their alimentary needs, construction materials, and daily subsistence

(MacLeod 1973). In short, woodlots represented an indispensable part of native Nicaraguans' landscape. To the colonial Spaniards, who had few immediate needs for the products of the forests save timber, pitch pine, and firewood, these 'unused' woodlots represented opportunities to increase trade, taxes, employment, and agricultural output (MacLeod 1973: 222-223). Though common grazing land may have been acceptable to a colonial Spanish mentality, common woodlots were "not part of their picture of a properly managed and governed society (MacLeod 1973: 222)." As the new state imposed its norms on the countryside, it "ignored the vast, complex, and negotiated social uses of the forest," replacing habitat with a notion of "resources to be managed efficiently and profitably (Scott 1998: 13)," which in this instance meant clear-cutting to establish plantations based on indigo and cattle. In this way, the Spanish colonizers made perhaps the first claim of the usufruct principle of land tenancy in Nicaragua, a notion that has been consistently invoked in Latin America up to the present day (Jones 1990: 21). It was also in this way that the hacienda El Obraje was founded, later to be rechristened Belén (CANTERA 2006: 15).

Without access to their traditional woodlands, the vanishing races of the lacustrine depression were forced to further acculturate themselves by taking up the consumption of cattle (MacLeod 1973: 215). This likely meant an increase in cattle rustling, particularly along the agricultural frontier of the Central Highlands, which was one factor blamed for an overall loss in the Central American cattle stock; but this does not seem to have been as much of a factor in western Nicaragua, largely considered the most hispanicized of the Central American colonial territories (MacLeod 1973: 307). For one thing, some 99% of the indigenous population had already been killed off, shipped off, or had died of disease. What is more, the two principal colonial cities of Nicaragua had been founded where there had previously existed high native population densities. So at the beginning of the 17th century when their lands were being seized, these native populations had already long been subject to

the labor draft, or *repartimiento* (MacLeod 1973: 295), and were well aware of the customs, diet, and habits of the Spanish cities. By way of continued interaction on the rural indigo, cacao, and cattle estates of the Spanish colonizers, western Nicaragua by mid-17th century was well on its way to being primarily mestizo and Spanish-speaking (MacLeod 1973: 325). By the close of the 17th century, even those settlements that could still be called indigenous possessed several hundred head of cattle, which were commonly traded for other goods and grazed on communal pastures (Newson 1987: 180). The 'basic grains' of the pre-invasion indigenous agricultural settlements – corn, beans, squash, chili peppers, *etc*. – were not lost, but rather incorporated into the new mestizo diet that included domesticated livestock, particularly cow, pig, and chicken.

Apart from the social impacts of the spread of indigo plantations, there were a number of ecological ramifications as well. The processing of indigo did not require immense amounts of manual labor, outside of one or two months per year (MacLeod 1973: 181); but that workforce had to be fed while employed, such that cattle were first introduced to plantation areas such as Belén not for purposes of export, but in order to meet the alimentary needs of the locally drafted *mano de obra* (CANTERA 2006: 16). These introduced head of cattle served a double purpose, though, when the workforce returned to their own family farms. After indigo seeds were broadcast, it was left to horses, mules, and cows to stamp in the seeds and remove excess grass not already burned off (MacLeod 1973: 179, Van Ausdal 2009: 709). Many plantation owners left their cattle and horses permanently in the indigo fields in order to keep down weeds, since the animals did not eat the indigo plants (MacLeod 1973: 179). In this way, livestock more or less replaced the indigenous population as the off-season workforce (MacLeod 1973: 428).

Unlike cacao, which could be incorporated into an agroforestry setting, indigo production was particularly land-intensive by colonial standards, and required engineering projects of a larger scale. Dams were built in order to

power water-wheels, and large vats were installed for the processing of the indigo plant into dye (CANTERA 2006: 15). Tracts of easily cultivated land near to cities and roads were taken up or seized in the diaspora of colonial Spaniards to the countryside (MacLeod 1973: 230). Though actual territorial extension of these incipient haciendas was small compared to what they would later attain, still the foundations were being laid for the structure of Nicaraguan land tenure for centuries to come – a structure based on cattle, indigo, cacao, and *peones* (MacLeod 1973: 329).

6. “La hacienda ganadera” (Sequeira Ruiz 1985)

By the 1630s, the Spanish monarchy had spread its resources too thin and was in the depths of a worsening fiscal crisis such that it could no longer afford to send trading ships to Central America (MacLeod 1973: 354). The crown, in a further attempt to collect tribute from its constituency overseas, almost entirely dropped its pretenses of acting in the interests of its invaded and exploited indigenous populations (MacLeod 1973: 223). This meant that land seizures by colonizers were no longer considered illegal, even if obtained by questionable means, so long as the perpetrator was willing to pay for it in fines entitled *composiciones* (MacLeod 1973: 223). Apart from the claiming of usufruct principle on wooded lots, another common method of land seizure was continually driving one’s cattle onto settled agricultural plots until the native inhabitants became fed up, were bought off, or were simply run off (MacLeod 1973: 300). In either case, if the native inhabitants dared to file a complaint, they would be obliged to present their land titles and pay their *composición*, neither of which they were able to do in most cases (MacLeod 1973: 300-301).

As the Spanish trading empire declined, so did the principal export market for indigo. Though some was still traded with Perú and Mexico via the Pacific Ocean (CANTERA 2006: 15), the shipping routes of the Caribbean became the domain of smugglers and pirates, who even sacked Granada via Lake Nicaragua in 1668 and again in 1670 (MacLeod 1973: 361, Brás 1994: 9). Though it was the indigo boom that brought Spanish landholders to the Nicaraguan countryside, it was a newly emerging rural economy that forced them to stay. In other words, once the mercantile endeavors of the Spanish export economy dried up almost entirely, those with resources enough turned to the “formation of the great estate (MacLeod 1973: 374).” Hides still had a domestic market, and one in Panamá, but there was not enough international,

or even interregional trade, to keep sufficient quantities of silver in circulation to serve as currency (MacLeod 1973: 292). Lacking a national mint, debasements and counterfeiting were attempted as traders lost more and more confidence in the devalued exchange rates (MacLeod 1973: 291). More money was invested in land, as opposed to commerce, as the barter economy became increasingly prevalent for purposes of local trade (MacLeod 1973). Cattle and cacao became the units of currency in a self-enclosed and, for most intents and purposes, self-sufficient rural economy. Tribute was exacted from indigenous villages in the form of cattle and other crops (Newson 1987: 307), and court cases were settled by order of the delivery of so many head of cattle to a given plaintiff (Archivo Nacional de Nicaragua). This manner of doing business made the possession of cattle all the more significant to the growing population of landowners of Spanish descent, whose herds and landholdings were increasing in disproportionate amounts to the distribution of the actual population. Much of this expansion in the 18th century took place in the traditional seat of administrative power, the Rivas isthmus, where wealth had been accumulated for centuries through the careful cultivation of cacao.

Though cacao seeds had never fully gone out of vogue as a form of small change, they regained in importance with the advent of the rural economy in the mid-17th century. There still existed a small market amongst European and colonial elites for Nicaraguan varieties of cacao, which were often described as "smooth and mild," but the harsher-tasting cacao from present-day Ecuador and Venezuela was cheaper (Radell 1969: 165, MacLeod 1973: 241). Regardless, cacao seeds were needed as a local form of currency, and the threat of pirates continued to make the prospect of its export unappealing (Radell 1969: 165, MacLeod 1973: 241). Therefore as the old cacao fields of the Niquirano were put back into production following the Spanish diaspora to the countryside, production was for the most part intended for local distribution, which decisively tipped the scale of power over to Granada in its old rivalry with León (Newson 1987: 257), an often bitter

rivalry that would come to cause much bloodshed. Those elites taking up possession of tracts of land on the Rivas isthmus and points further south were, on an official level, still citizens of Granada, and hence controlled their monopoly on cacao coinage for purposes of local Granadine commerce. Meanwhile León, still dependent on debased silver, suffered severe inflations on a regular basis (MacLeod 1973: 249). Those Granadines that took to the Rivas isthmus, therefore, established plantations based on the mixed economy of cattle, cacao, and indigo. "From a population of 2,958 in 1717 the town of Nicaragua [Rivas] grew to 4,534 in 1752 and to 11,908 in 1778 (Newson 1987: 258)." In 1783, Rivas was granted formal title as an independent 'villa' against the wishes of those who had remained in Granada and who did not wish to lose administrative control over the wealthiest region in Nicaragua (Radell 1969: 163, Newson 1987: 258).

The lowlands of Rivas still encountered complications in the dry season with regard to cattle ranching (Newson 1987: 265). Transhumance was the practical solution, but Granadines with capital to invest increasingly opted to simply raise their large cattle herds where they had been moving them previously; hence the growth of large-scale cattle estates in the savannahs of Sebaco and Chontales, and in the grasslands of Nicoya and Guanacaste, south of the Rivas isthmus (Radell 1969: 164, Newson 1987: 258). By 1757, one particular landholder in Chontales is said to have acquired some 100,000 cattle (Newson 1987: 265). Though this particular figure represents an exception, not the rule, still it is indicative of the immensely unequal distribution of wealth that has characterized Nicaragua since its founding as a Spanish colony.

While the lands and herds of the Granadine and Leonese elites were expanding as an "asylum for capital" in an economy with little interregional trade, those laborers that worked these lands and tended these herds were increasingly coerced into often exploitative forms of labor, such as debt peonage, sharecropping, or indentured servitude (MacLeod 1973: 225, 296, 321). In debt peonage, not uncommon to the plantations of Rivas, landowners

would advance laborers certain, sometimes trivial, sums of money on the condition that they would return at harvest season to work in the processing of crops such as indigo or sugarcane (MacLeod 1973: 225). Often, though, the landowner's harvest would coincide with the harvest of the laborer's individual agricultural plot, so that a poor personal harvest would translate into the necessity of taking additional advances, requiring one to work again in the next indigo or sugarcane harvest, thus perpetuating the cycle of debt. If one did not possess his or her own plot of land, one might be forced to seek out an agreement whereby one would rent out a plot on a landowner's hacienda in return for a certain amount of labor provided or a certain percentage of crops raised, an arrangement known as sharecropping (MacLeod 1973: 225). In some other cases, a laborer, or *peón*, might simply attach him/herself to a particular hacienda in return for "food, clothing, and housing, and sometimes a small wage (MacLeod 1973: 225-226)." Such *peones* had limited freedom of mobility, and could be bought or sold like any other material asset (MacLeod 1973: 226).

Certain scholars have argued that to some landless peasants, these contractual relationships of servitude may have seemed a preferential option to life in the tribute-ridden indigenous settlements or to a mendicant existence begging in the colonial cities (MacLeod 1973: 226). Others have claimed that this very dichotomy of landowners and debtors, of *patrones* and *peones*, was intentionally designed to produce and sustain what we now know of as the "*Nicaraguan peasantry* (MIDINRA 1984: 4)." In this line of reasoning, common within the rhetoric of the Sandinista Revolution, the landowning oligarchy of 18th- and 19th-century Nicaragua not only dispossessed small farmers of their land, but also suppressed the development of the domestic market to ensure that the majority of the population continued to live at a subsistence level so that labor would remain remarkably inexpensive (Wheelock and Carrión 1980: 1, MIDINRA 1984: 4-5).

Still other scholars have posited the historical economic inequality between the social classes of landed and landless in Nicaragua, and in Latin America in general, as a root cause of environmental degradation (Painter 1995). This is explained as a double-edged sword, as those who have land and wealth "appropriate natural resources without being accountable for the social or environmental consequences of their actions (Painter 1995: 12)," while those without land engage in the "overuse of resources elsewhere as people relocate to escape inequities (Painter and Durham 1995: *viii*)."

By way of example, in the 18th century while Nicaragua's elites were expanding their holdings around the lakes, their cattlemen were also driving their herds to pasture in the dry season in the higher and moister altitudes of the agricultural frontier of the Central Highlands (Newson 1987: 266). Apart from the requisite burns this would have entailed to produce more abundant grasslands out of the mixed pine-deciduous woodlands native to the area, the grazing of cattle on, and associated devegetation of, the pronounced topography of departments such as Nueva Segovia and Matagalpa was also bound to produce a higher rate of soil erosion. At the same time, it is likely that those lands in Nueva Segovia and Matagalpa usurped for purposes of grazing cattle were amongst the more accessible and more desirable lower portions of the valley bottoms, which would have forced the rural agricultural populations already settled there upslope. While grazing cattle on steep slopes can contribute significantly to soil erosion, preparing land for agriculture can be even more destructive for the topsoil, resulting in further erosion. A pronounced rate of soil erosion can in turn expose bedrock or underlying clay soils that do not absorb precipitation readily. This results in a greater potential of flash floods that can and have caused considerable damage to cattle, crops, and human settlements alike.

Flash floods were first reported by the Audiencia of Guatemala in 1592, and by the 1690s they occurred nearly every year (MacLeod 1973: 306). Today, flash floods in Central America commonly occur during the rainy

season, sometimes multiple times a year, and they account for considerable destruction of crops, property, and lives. Though Central America is a region of the world particularly prone to extreme climate-related and seismic events, the flash floods that occur there annually constitute one phenomenon that can be traced to a specific anthropogenic process of land degradation found within the historical record.

Though historical accounts are not uncommon of the reforestation of parts of the Central American isthmus following the rampant depopulation of its native inhabitants (Jones 1990: 18), this does not appear to be the case in Nicaragua. Judging from reports of the expansive anthropogenic savannahs and the large population density, pre-invasion western Nicaragua appears to have been a carefully managed landscape. The rapid proliferation of livestock in the wake of the rapid disappearance of the native population may have been one factor in preventing widespread reforestation. The colonial Spanish uptake of fire as a means of land management, as well as the thriving pitch pine export industry of Nueva Segovia, were also undoubtedly factors. Once cattle developed into a form of currency, a mark of land tenancy, and a symbol of the accumulation of wealth in general, the maintenance of pastureland became an essential to Nicaragua's oligarchy, and additional deforestation to make room for more grassland is likely to have occurred. Cattle did not maintain their prestige status, though, through the course of the 19th century, as large-scale global forces of revolution and domestic battles for political supremacy stretched the resources and manpower of the country thin, and cattlemen were forced to take stock of what they had.

…

Summary of Part I: Invasion

What is encountered in the historical record of 16th-century Nicaragua is a clash of cultures as pronounced as nearly any in the recorded history of the world, with immense societal and ecological ramifications on both sides of the equation. On the one hand, we have the native western Nicaraguans: settled

agriculturalists with a moderate-to-high population density and land-use practices that promoted the abundance of utilitarian natural resources. Among these practices were the cultivation of cacao in an agroforestry setting; the communal ownership and stewardship of agricultural croplands and forested woodlots that provided much in the way of wild foods and other materials; and the use of controlled fires in order to create a mosaic-like heterogeneous landscape, presumably rich in species diversity and biodiversity in general (cf. Balée 2006: 77). Though land degradation was presumably present to some degree within this landscape, it paled in comparison to what was to succeed it.

On the other hand, we have the Spanish conquistadors: adventurers and opportunists who made a career out of the maximal exploitation of natural resources at any cost. Viewing Nicaragua's native population as less than worthy of human dignity, the conquistadors first struck upon slavery as their resource to be maximally exploited. Once the non-Christian nuisances had been largely extirpated, their fields and savannahs were opened to colonization by another kind of invader: the cow. The cow served as a kind of European vanguard to interpenetrate and ostensibly 'tame' what was considered the 'wild' frontier of nature, producing a landscape that was more controllable to the European sensibility (cf. Cronon 1983, Gudynas 2010: 270-271). With far more ample grasslands under hoof than would have been available in peninsular Spain, the population of the open-range Iberian cattle proliferated enormously with little to no additional deforestation than that which had already been designed by the former indigenous population. Each generation of cow further acclimatizes to the tropical conditions until a new breed emerges: the criollo.

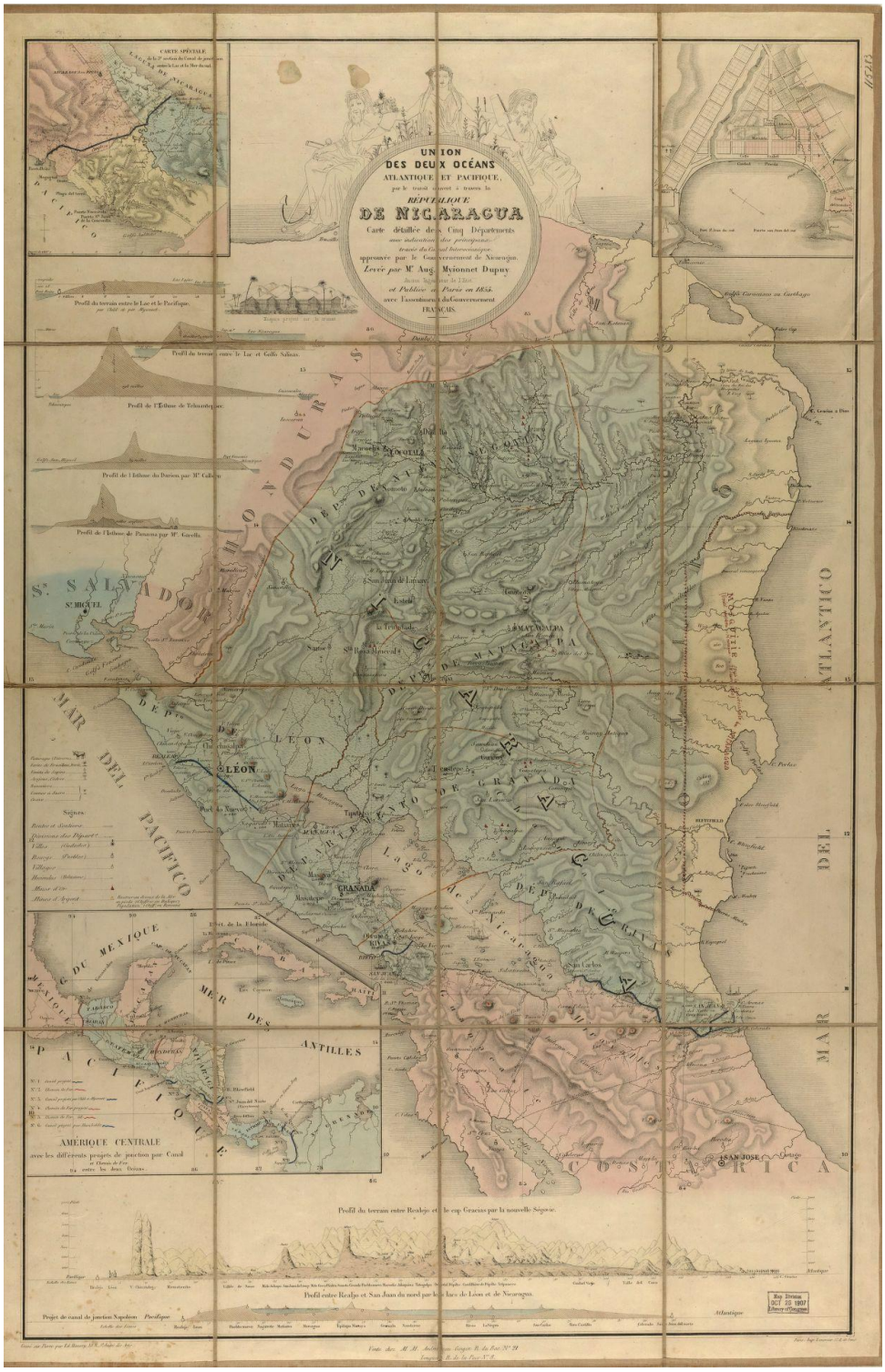
Cattle ranching, specifically export of hides, was soon thereafter established as a baseline economic activity of the colonial Nicaraguan economy, though further export 'booms' continued to be sought after. Indigo became a short-lived financial phenomenon, pushing Spanish landholders farther out into the Nicaraguan countryside, where they usurped and degraded

the forested woodlots of the dwindling indigenous population. Where previous had occurred preserves for wild animals, wild foods, and other utilitarian forest products, now indigo was being cultivated as a monoculture, decreasing infraspecific crop biodiversity and increasing the ecological vulnerability of human, animal, and plant communities alike (cf. Scott 1998: 21, Balée 1998: 22).

Elsewhere cattle were the usurpers, overrunning agricultural lands and grazing in the dry season in moist valley bottoms from which settled populations were pushed further upslope into areas that are not ideal for agriculture. Though likely not entirely uncommon prior to the Spanish invasion, flash floods presumably increased as a result of the soil erosion that resulted from this demographic shift. Even in the colonial era, though, it is evident that it was neither the cows nor the cowherds, many of whom are indentured servants, that are the great instigators of environmental degradation. Rather it was a profit-driven mentality on the part of the conquistadors and the colonial Spanish elite, which demanded total resource exploitation with no regard for environmental or social ramifications, that was the root cause of degradation.

Administrative involvement from the Spanish crown in these matters decreased regarding protections afforded Nicaragua's indigenous populations and their lands. At the same time, it increased regarding taxes levied against goods and property and demands made on agricultural [read: monocultural] output. With the realm's resources spread paper thin, the next great threshold of change was primed to sweep almost the entirety of Nueva España.

Part II: Independence



1855 map of Nicaragua, showing the proposed routes of an interoceanic canal

by Aug. Myionnet Dupuy

courtesy U.S. Library of Congress

7. “La guerra es contra el ganado” (Sequeira Arellano 1961)

The last of Spain’s monarchs from the Habsburg dynasty died in 1700, which was followed by the War of Spanish Succession that put the Bourbon dynasty on the Spanish throne in 1714 (Crawley 1984: 24, Brás 1994: 10). Though Central America was at this point quite far removed from its administrative nucleus in Europe, still the repercussions were felt in the Spanish colonies. The Habsburgs in their two centuries of control had enforced strict monopolies, allowing the colonies only to trade on a limited basis amongst themselves or directly back to Spain, but not to any other foreign merchants (Brás 1994: 10). This of course benefited the Spanish crown, but it also benefited the landed aristocracy of Granada, who had access to both the raw materials of production and to the shipping channel to the Caribbean and beyond along the San Juan River. By mid-17th century, once Spain had to deal with rebellion at home and could no longer even afford to send their shipping fleet overseas, this monopolistic conservatism benefited no one, and trading to English and Dutch smugglers became the *modus operandi* (MacLeod 1973: 352-354). When the Bourbon dynasty took power in Spain in 1714, they espoused a considerably more liberal trading policy, even allowing Britain the courtesy of sending one trading ship a year to Spanish America (Crawley 1984: 24, Brás 1994: 10). Having amassed small fortunes under the old protectionist system, the elites of Granada continued to support conservativism. Having suffered for decades from trade restrictions with Mexico and Perú, despite their naturally advantageous location on the Pacific Coast, the merchants of León readily lent their support to free-trade liberalism. The old sibling rivalry now had at issue matters of national economic policy.

Though the relationship between these two colonial cities was not a harmonious one, still it was tempered by their mutual allegiance to the Spanish crown, and the military power that lay vested there (Radell 1969: 176). In

1794, the Spanish Empire was invaded by French forces, and as it attempted to retain its wealthiest American colonies, it further neglected those in Central America (Brás 1994: 11). Discontented with a government composed almost entirely of Spanish-descent elites and dealing with the effects of prolonged and widespread drought (Claxton 1993: 222), El Salvador rebelled with success in 1811, followed shortly thereafter by an uprising in Rivas, Nicaragua, which was quickly put down with impunity by Costa Rican forces (Brás 1994: 11). Another uprising soon broke out in Granada that ended in the city's near-destruction by Leonese forces (Crawley 1984: 28, Newson 1987: 259). It was not until 1821, when the Captaincy General of Guatemala formally issued its own independence from Spain, that the Guatemalan province of Nicaragua received its own freedom, but this was just the beginning of a new form of violence in Nicaragua.

Without the Spanish crown as an intermediary, the traditional political antagonism of Nicaragua's two main cities turned into outright civil war, and the country's modest economy was shattered as a result (Radell 1969: 176). Within days of Guatemala's declaration, León declared itself independent of Guatemala, while Granada maintained its dependency (Crawley 1984: 28). Both joined Mexico in 1822, while continuing to squabble domestically, but when that union dissolved in 1823, Granada declared itself an independent republic in the face of the 1,000-man Leonese army sent to besiege the city (Crawley 1984: 28). Disillusioned with the turbulent politics of civil war, the wealthy department of Nicoya chose to secede in 1825, joining the new republic of Costa Rica, and adding to that state a region of large-scale cattle estates built on the model of Nicaragua's colonial settlement pattern (Radell 1969: 175). From 1825 to 1854, a period of 28 years, Nicaragua had no less than 25 successive heads of state; barely a year went by without two or three revolutions (Radell 1969: 179). To add flames to the fire, the unexpected eruption of Cosigüina in 1835 caused considerable damage to life and property

(Bundschuh and Alvarado 2007: 43). In 1849, three different men rose to the rank of president, then four men did the same in 1851 (Radell 1969: 179).

To be an agricultural peasant in this era was dangerous, as you or your cows were liable to be commandeered and forced to serve the interests of the conflicting armies. In the hinterlands of the rival cities, men went into hiding, agriculture went into decline, and people went hungry. In addition to the near-constant political upheavals, peasant revolts broke out in the 1840s against the central government's attempts to control the labor force and the country's more lucrative products such as tobacco and liquor (Gobat 2005: 32). Additional troubles had developed in terms of the health of the Nicaraguan herd with the outbreak of an infectious disease referred to as murrain and the indiscriminate slaughter of female cows, due to variations in market price and lack of foresight (Sequeira Arellano 1961: 30, Newson 1987: 265).

It has been stated that "*every revolution brought with it a large open slaughter of cattle* (Sequeira Arellano 1961: 30)," the most violent of which may have been William Walker's 1855 invasion of Nicaragua (Valdivia Hidalgo 1968: 6, Gobat 2005: 39). This invasion, which will be further contextualized in the next chapter, placed the firm stamp of U.S. involvement in the politics and governance of the young Central American republic of Nicaragua. Walker's forced departure from the country left in its wake a wave of destruction for people and animals alike. Walker's *filibusteros* raided farms; rustled livestock; razed cities including Granada and its hinterlands, historically a center of cattle ranching in Nicaragua; and spread diseases such as cholera throughout the Rivas peninsula (Gobat 2005: 39-41). In sum, the tumultuous conflicts of the early 19th century did much not only to reduce the size of cattle herds in Nicaragua, but also to attract the attention of the emerging imperialist power to the north. The relationship forged between the U.S. and Nicaragua would have manifold social, governmental, and ecological effects that are felt up to the present day.

8. “Imperialismo ecológico” (Palacio Castañeda 2006)

As early as 1823, U.S. President James Monroe, in an address of rather minor significance in his own time, stated unilaterally the United States’ position that it would oppose any future attempts at colonization in the Americas by any of the European powers (Bermann 1986: 6). This proclamation was primarily intended to address negotiations with Russia over commercial sovereignty in the Pacific Northwest (Bermann 1986: 6). It was not until thirty years later that this sentiment would be resurrected and distorted into a trumpet call for North American expansion and intervention throughout Central America and the Caribbean. This intervention would ultimately manifest itself in multiple interrelated spheres: political, military, social, economic, and ecological.

George Ephraim Squier, one of the first U.S. diplomats to visit Nicaragua, arrived to the country’s western savannahs on June 22, 1849, marking the initial stages of U.S. intervention in the young Central American republic (Brás 1994). This visit coincided with the California gold rush of 1849 and with impending plans for an interoceanic canal through Nicaragua that would ferry settlers from the eastern United States to the Pacific Coast. In his subsequent writings, Squier described a landscape that was “abounding in broad savannahs, well adapted for grazing and supporting large herds of cattle (1860: 643).” That Squier also described cattle estates of “not less than 10,000 or 15,000 head of cattle each (1860: 649-650)” is further testament to the resilience and adaptability of the native criollo breed, which had survived multiple decades of incessant wars and raids. Squier also described silvopastoral systems that incorporated the *jícaro* tree (*Crescentia cujete*) with cattle pasturage (1860: 501). Upon encountering the town of Belén, then known as El Obraje, he described a “wonderfully fertile” area, planted with “papaya trees, now loaded with golden fruit (1860: 503-4).” He also predicted

that “if the attention of the people of Nicaragua should be seriously directed to the production of coffee, it would prove a source of great profit (1860: 651).” This advice was soon to be heeded.

By his own account, Squier had been received with open arms by Nicaraguan politicians and elites, the country’s bishop even wishing for “an infusion of your people to make this broad land an Eden of beauty, and the garden of the world (Gobat 2005: 27).” Though it may not have been universally professed in the Nicaraguan countryside, this wash of pro-U.S. sentiment amongst the country’s elite stood in contrast to much of Central America’s reaction to the 1846 U.S. invasion of Mexico (Gobat 2005: 27). Still, it was prevalent enough to grease the wheels for a concession granted to U.S. business magnate Cornelius Vanderbilt to establish exclusive steamboat service up the San Juan River to Lake Nicaragua, then overland to San Juan del Sur (Bermann 1986: 31). Vanderbilt’s Accessory Transit Company began operation in 1851, following the passage of the Clayton-Bulwer treaty between the U.S. and Great Britain (Bermann 1986: 31). This brought throngs of gold-hungry travelers to the ports of Nicaragua, provoking local squabbles and new capitalist enterprises, and introducing the country to North American customs, business relations, and consumption patterns (Gobat 2005: 23-24). It also introduced Nicaragua’s feuding elites to the idea of enlisting North American mercenary forces to fight their battles (Bermann 1986: 33).

Known as filibusters, these North American contracted militias often saw themselves as agents of Manifest Destiny, brandishing the sword of the Monroe Doctrine in a distorted nationalistic fashion. One such filibuster, William Walker, was invited by the liberal elites of León to conduct a campaign against conservative-controlled Granada. Arriving in 1855 with a group of 57 fellow soldiers-of-fortune, Walker’s forces were to swell into the thousands as he went on to sack Granada, install himself as president of Nicaragua, proclaim English as the country’s official language, and legalize slavery (Brás 1994: 14-15). Walker’s fortunes turned, though, as he went about

confiscating and redistributing the large cattle and cacao estates of Chontales and the Rivas peninsula (Gobat 2005: 36). Alarmed at the prospect of losing their landbase, liberal and conservative elites of Nicaragua went against precedent by joining forces amongst themselves and with other Central American republics, establishing a neutral capitol city at Managua, and waging a costly 'National War' that devastated Granada and its hinterlands and spread a virulent cholera epidemic wherever foreign forces had tread (Brás 1994: 16, Gobat 2005: 38-40).

It was not until William Walker's departure in 1857 that a period of relative peace could gain a foothold in conservative-controlled Nicaragua. Peace did not mean prosperity for all though. By the mid-19th century, the elite had evolved into a group of oligarchic, politically connected families who acquired their large estates, or *haciendas*, for the most part through inheritance or intimidation. As the landowners themselves owned the means of production on the cattle estates, they were able to accumulate capital through the sale of live cows, meat, and hides to neighboring territories and countries. This permitted the elites not only a high standard of living and social prestige that some scholars would come to term a "culture of pastures (Jones 1990: 14)," but it also allowed them regional political power that helped to self-perpetuate the *status quo* in terms of the social hierarchy (Sequeira Ruiz 1985: 18). Many of these same elite had outwardly supported Squier's visit, Walker's invasion, and the potential for a U.S.-controlled interoceanic canal and its attendant industrial modernization (Gobat 2005: 25-27). Many mestizo peasants who worked the land had either long since been ensnared into a cycle of debt (MacLeod 1973), or else opted for low-wage *hacienda* or plantation work in lieu of eking out a subsistence in the less productive highlands to which they had been forced (Crawley 1979: 34). As mentioned, the rural revolts of the late 1840s, in response to increasing demands on the labor force, may even have ultimately contributed to Walker's arrival on the Nicaraguan political scene (Gobat 2005: 25-26).

Though it had been negatively affected by the wars and revolts of the 19th century, extensive cattle ranching remained the primary economic activity of western Nicaragua as of the time of the 'Thirty Years' without civil war, 1857 to 1893, though it was soon to have competitors. This was a time of renewed commercial interest in the international export market throughout Central America and the Caribbean, which meant considerable land-use changes on the local level in a manner that some scholars refer to as "*ecological imperialism* (Palacio Castañeda 2006: 20)," or as the "first wave of capitalist development (Faber 1993: 85)." Since the collapse of the colonial Spanish shipping empire, there had not been a readily accessible foreign market for Nicaraguan goods. In the interim, European textile mills, which had once imported indigo and cochineal from Central America for use in dying fabrics, had found dye substitutes in the form of relatively cheap synthetic chemical products (Faber 1993: 21). This meant that there was no longer an incentive among Nicaraguan landowners to prioritize the cultivation of traditional crops for export; hence merchants turned their attention to non-traditional crops that would alter both the ecology and the social fabric of the Nicaraguan countryside.

Coffee was first introduced from Costa Rica to the Carazo Plateau south of Managua sometime around 1825 (Radell 1969: 186), but it was not until the establishment of relative peace after 1857 that an influx of British, French, and North American business interests coincided with a global fervor for the "golden bean" (Faber 1993: 22). This resulted in a rapid expansion of coffee cultivation, along with the introduction of the banana, in order to meet the demands of European and North American consumers (Crawley 1984: 34). By 1856, Managua had been established as the new capital of Nicaragua, and soon new roads, ferries, and ultimately railroads ran from the interior to the coast via the fishing-village-turned-bustling-commercial-center (Radell 1969: 183, Bermann 1986: 124). As coffee gradually replaced cattle as Nicaragua's primary export, Managua's population, economic importance, and political

importance only rose in stature (Radell 1969: 184). By the 1870s, the domestic elites of Nicaragua had managed to consolidate state power such that they could go ahead with a series of 'reforms' aimed at optimizing the ecological and social conditions for coffee production (Faber 1993: 23). This meant the appropriation of communally owned, public, ecclesiastical, and untitled land; the creation of a "cheap work force of coerced labor" by way of debt peonage; the strengthening of state institutions such as the subsidization of export producers; and the expansion of transportation and communication infrastructure, especially into and out of Managua (Faber 1993: 23, Gobat 2005: 54-56).

The Agrarian Reform Law of 1877, which favored colonization of the Central Highlands' communally owned lands, resulted in a number of foreign-owned and well financed coffee plantations in the area of Matagalpa, Muy Muy, and elsewhere (Radell 1969: 203). This also resulted in a massive uprising by several thousand indigenous Matagalpans who saw their political autonomy and religious freedom being threatened by the expansion of the Nicaraguan state (Bermann 1986: 125, Gobat 2005: 50-51). Swiftly put down by government forces, many of these same indigenous Matagalpans were forced to relocate onto more marginal lands, where they essentially became the "pioneers of the coffee frontier (Radell 1969: 203)."

Meanwhile, banana trees were planted in Belén and elsewhere on the Rivas isthmus, where they were at first utilized as shade trees for cacao seedlings (Radell 1969: 166). An effort to reinvigorate the cacao trade was attempted in areas not suited for the cultivation of coffee, and one million cacao tress were said to be producing on the Rivas isthmus as of the 1870s (Radell 1969: 168). The effort, though, was short-lived in this region governed by a dynamic climate regime. The volcanic eruption of Ometepe in 1883 and several years of drought at the end of the 19th century greatly impacted cacao harvests and killed off many of the trees themselves, after which cacao was relegated to a position of only minor significance within Nicaragua's

commercial agricultural output (Radell 1969: 168-170). The banana, at first considered locally as little more than food for pigs, would soon assume a role of much greater significance (CANTERA 2006).

These newly introduced cash crops required cheap labor to make it to market in a cost-effective manner. With the disintegration of communally held properties, many peasants lost their traditional access to land and independent livelihood, leading some to take to the towns and join the swelling number of urban poor (Gobat 2005: 56). Many others survived by working under demeaning and debilitating conditions on the often foreign-owned commercial plantations by which they found themselves surrounded (Gobat 2005: 56). Still other peasants had managed to take advantage of the sudden availability of capital and expand their holdings, often at the expense of fellow peasants (Gobat 2005: 56). This meant in the end a more stratified peasantry, "with kinship and patronage key to peasants' changing fortunes (Gobat 2005: 56)."

Apart from coffee, the agroexport boom of the second half of the 19th century also impacted the cattle industry in some drastic and long-lasting ways. The influx of foreign business interests in Nicaraguan agriculture resulted in greater attention paid to the management of pastures and, ultimately, the selective breeding of the cows themselves. 'Improved' African grass species were introduced around this time, such as guinea, also known as asia (*Urochloa maxima*), pará (*Urochloa mutica*), and jaragua (*Hyparrhenia rufa*) (USDA 2000, GISD 2006, GISD 2010). The success ratio of these new grasses was such that they were taken up and spread hurriedly by agricultural producers throughout much of tropical Latin America (Van Ausdal 2009: 711). This marks a watershed event in cattle ranching in the Americas, as the forage base for livestock moved from semi-natural savannah grasses to artificial pasturelands, mostly hewn out of lowland forests (Van Ausdal 2009: 711). By rapidly forming a dense ground cover, these grasses once sown were able to halt the regeneration of second-growth woods, producing semi-permanent pasture in a way that native grasses were unable to (Van Ausdal 2009: 712).

What is more, these African grasses were better suited to the excessive trampling of domesticated livestock, having evolved in a landscape replete with large hooved herbivores, animals which had been extinct in Central America for many millennia (Van Ausdal 2009: 712). Though one native grass, grama (*Paspalum* spp.), remained the dominant pasture grass for some time (Sequeira Ruiz 1985: 78), the introduction of exotic African grasses to the Nicaraguan landscape irreversibly altered ranchers' ability to create vigorous pasture and the composition of those pastures up to the present day.

Thomas Belt, an English naturalist who lived in Nicaragua from 1868 to 1872, noted guinea and pará to be already well established in certain pastures as of the time of his visit (1888: 308). He also repeatedly describes "rolling savannahs," "dry savannahs," and "well-grassed savannahs," in addition to the expansion of agricultural lands by means of fire (1888: 53). His remarks on cattle confirm that the criollo remained the exclusive breed of cow in Nicaragua at that time (1888: 308-310). His is also one of the first descriptions of the landscape around Muy Muy, stating among other more disparaging remarks that "the land around was fertile… Some of them possess cattle; and those that have none sometimes help those that have, and get enough to keep them alive (1888: 215)." The more things change, the more things stay the same.

9. “El modelo de acumulación capitalista” (Barahona 1988: 37)

The thirty years of conservative rule did much to establish the bases of modern capitalism in Nicaragua in the way of cash crop production, improved transportation and communication, and an exploitable labor force; but by the 1890s the conservative framework could no longer keep up with the pace of the growing coffee export market and the new class of Managua businessmen capitalizing off of this growth (Bermann 1986: 125-126). In 1893, the ‘July Revolution’ broke out, led by among others General José Santos Zelaya, the son of a Managua coffee planter who would a few months later become Nicaragua’s controversial new president (Bermann 1986: 126, Brás 1994: 17-18). Despite his sometimes openly anti-interventionist policies and rhetoric, Zelaya invited foreign investment into Nicaragua, accelerating what some have termed “*the capitalist accumulation model*” of national development (Barahona 1988: 37). In this way, Zelaya further expanded coffee production and augmented banana exports, unseating cattle ranching as the country’s primary economic activity. His government built new roads, rail lines, and seaport facilities, as well as government buildings and schools (Brás 1994: 18).

Zelaya also furthered the plantation system as the norm for Nicaraguan commercial agriculture (Crawley 1984: 34). As a result of economic concessions granted to U.S.-owned companies, Cuyamel Fruit Company, Atlantic Fruit Company, and Standard Fruit Company all bought up plantations larger than 100,000 acres apiece, further cutting into what had previously been considered communal public land (Faber 1993: 31-36). This in turn tied more and more peasants to exploitative foreign agricultural producers (Faber 1993: 31), and initiated the commercial ascendancy of the banana in lowland regions of the country.

Zelaya’s rise to power coincided with the U.S. financial crisis of 1893 that bankrupted the Maritime Canal Company of Nicaragua, which had been

engaged in the construction of an interoceanic waterway through Nicaragua for the past five years (Gobat 2005: 47). Intent on a Nicaraguan canal and the expanded commerce it would bring to the country, Zelaya was also intent on Nicaraguan and Central American sovereignty over its own affairs (Brás 1994: 18). Nevertheless, by 1902 Zelaya was willing to sign a canal treaty that gave the United States ownership in perpetuity over the six-mile-wide canal zone (Gobat 2005: 68). Despite some later commentary to the contrary, Zelaya appeared to highly regard and even emulate the United States' model of economic and political development (Gobat 2005: 67); so it is safe to assert that he was quite affected by U.S. President Theodore Roosevelt's blitzkrieg maneuver in 1903 to fund an uprising in northern Colombia, recognize the newly sovereign state of Panamá, and obtain sovereign rights for an interoceanic canal there (Crawley 1979: 37). By this time, United States firms controlled most of the agroexport and mining industries in Nicaragua as a direct result of concessions granted by the Zelaya administration; regardless Zelaya now turned to other investors as well. He first approached Great Britain and France, then Germany and Japan, with plans of a rival canal through Nicaragua (Gobat 2005: 69). He also sought European development loans in defiance of the 1904 Roosevelt Corollary to the Monroe Doctrine, which asserted U.S. financial hegemony over the Caribbean Basin (Bermann 1986: 150, Gobat 2005: 69).

In contrast to other key sectors of the Nicaraguan economy such as logging and mining, cattle ranching remained largely in the hands of the domestic elite during the Zelaya era, though new breeds were beginning to appear as a result of the opening-up of Nicaragua's economy. Highly adaptable to tropical climates, the Indian Zebu cattle had been introduced into Jamaica as of 1860, and eventually made its way to Nicaragua as of the beginning of the 20th century (Rouse 1977: 286-90). Though initially imported as a draught animal, the advantages of this breed in terms of meat and milk production were also evident. Around the same time, a native Nicaraguan interested in selective

breeding, Joaquín Reyna, was developing a local breed from hand-picked criollo cows with a relatively high level of milk production (Rouse 1977: 179). The result was the Reyna breed, a hardy cow that would be utilized for cross-breeding purposes over the course of the next century.

In 1905, Zelaya's Ministry of Agriculture and Cattle Ranching issued a *Law concerning Conservation of Forests*, the first of its kind in Nicaragua, which sought "*to impede the irregular or exaggerated cutting of the forests and of the vegetation that protects the fertility of the soil* (Zelaya 1905)." Utilizing verbiage that directly links the fragmentation of native woodlands with "*the drying out of springs, the lack of rain and the consequent drying out of fields and public lands*," this document highlighted a discourse between the exploitation of natural resources and the protection of ecosystem services contemporaneous with that of Gifford Pinchot in the United States (Gudynas 2010: 273). Though Zelaya's law was almost certainly directed at North American timber companies rather than domestic cattle ranchers, this document initiated a discourse between the exploitation of natural resources and the protection of ecosystem services that goes on to this day. The more things change, the more things stay the same.

With the loss of the U.S. canal contract, the political stability afforded by Zelaya's heavy military hand became less useful to domestic elites (Gobat 2005: 68). Through the course of his presidency, Zelaya's regime became increasingly more authoritarian, upsetting the elites to the point that some became involved in efforts to overthrow the president-turned-dictator (Gobat 2005: 68). Zelaya's continued efforts for a unified Central American republic, and the execution of two U.S. citizens captured while fighting for insurgent forces, led U.S. President William Howard Taft to exercise the recently touted Roosevelt Corollary to the Monroe Doctrine, which essentially established the U.S. as an international police force to protect against "chronic wrongdoings or an impotence which results in a general loosening of the ties of civilized society (Crawley 1984: 37)." In a classic example of what came to be known

as ‘gunboat diplomacy,’ Taft sent in the U.S. marines in 1909, forcing Zelaya to resign and ushering in a new era of U.S. intervention in Nicaragua. U.S. stakeholders, whether in the form of bankers or marines, would maintain an almost continuous presence in the country for the next 24 years.

10. “Los marines se llevaban todo…” (CANTERA 2006: 109)

Prior to abdicating, José Santos Zelaya attempted to curb the impending U.S. invasion by handing over his position to a longstanding Liberal critic of his, José Madriz (Gobat 2005: 70). U.S diplomats had other plans, lending their support to the more conservative forces of General Juan José Estrada, but on one condition: that they accept the terms of the “Dawson Pact (Bermann 1986: 151).” Among other tenets, the Dawson Pact obliged the new Nicaraguan government to accept the terms of a U.S. loan, even though the Zelaya/Madriz era had left a surplus in the Nicaraguan national treasury (Bermann 1986: 152). A contemporary to other economic-dependency measures enacted by the United States throughout Central America and the Caribbean, measures collectively termed “dollar diplomacy,” the Dawson Pact attempted to turn Nicaragua into a U.S. financial protectorate (Gobat 2005: 75). At the same time, the U.S. government sought to avoid the “menace of revolutionary disorder” (even though it had just staged its own revolution) by re-imposing the exclusionary order of the Conservative old guard (Bermann 1986: 153, Gobat 2005: 76). In this way, early 20th-century U.S. policies in Nicaragua grossly underestimated the country’s political dynamism, and the will of non-elite sectors of Nicaraguan society to resist.

A severe drought struck much of western Nicaragua between March and July of 1912, negatively impacting the production of basic grains (Gobat 2005: 94). What is more, the landmass dedicated to these basic food crops had already been reduced through the course of the second half of the 19th century as haciendas expanded in order to make room for agroexport crops such as coffee, bananas, and cattle (Gobat 2005: 96). Governmental authorities at first did not allow imports of basic grains from California to assuage growing hunger domestically; but once they did allow the imports, price speculation by merchants fueled a current of anti-elite sentiment as rural violence resulted in

cattle-rustling and the occupation of recently usurped, previously communal lands (Gobat 2005: 97).

Open fighting broke out on July 29, 1912, as bourgeois revolutionaries led the masses in an attack against the "U.S.-sponsored oligarchic restoration of 1910" and its attendant financial austerity measures (Bermann 1986: 161, Gobat 2005: 100). The revolutionaries espoused such rhetoric as blaming "Wall Street bankers" and a "handful of Nicaraguan oligarchs" for the pronounced discrepancy in wealth that permeated Nicaraguan society (Gobat 2005: 102). The more things change, the more things stay the same. These same revolutionaries, many of whom were medium-sized cattle ranchers from the hinterlands of Granada and León, summoned the local peasantry to whom they rented out lands, often in exchange for labor, and led a full-on offensive against the privileged elites of their respective cities (Gobat 2005: 105). In this interesting turn of events, the agroexport boom of the latter half of the 19th century, which had mostly favored the landed oligarchs, at the same time allowed the creation of a bourgeois middle class large enough to mobilize the social capital of the masses when the prospect of a complete return to the oligarchic exclusionary system seemed imminent. Once mobilized, this social capital of the masses took on a life of its own, such that it could no longer be contained by those who summoned it.

The anti-elite violence struck such a fevered pitch that it began to be directed against foreigners and merchants of all stripes, bourgeois middle class included. This incited U.S. President Taft to authorize a full-scale invasion of Nicaragua by 2,300 marines and sailors, which constituted the largest U.S. invading force to yet enter Central America (Gobat 2005: 109-111). This invasion was widely considered both in the United States and in Nicaragua as an invasion "simply to defend U.S. business interests in Nicaragua (Gobat 2005:111)." It was neither the first nor the last of its kind, but perhaps the longest, as a contingent of Marines would remain stationed in Nicaragua for the next twenty years. The uncontrollable violence of the masses, combined

with the impressive force of the invading marines, led the revolutionary leader of Granada, Luis Mena, to surrender unconditionally, despite his previous vow to "not be like Zelaya (Gobat 2005: 117)." Former Zelayista General Benjamín Zeledón, stationed in Masaya, held out against U.S. forces until captured in battle. U.S. Major Smedley Butler afterwards wired to his commanding officer, "Personally would suggest that through some inaction on our part some one might hang him (Bermann 1986: 164)." Zeledón died of undocumented causes shortly thereafter, and his corpse was dragged around surrounding towns, á la Hector of the Greek epic. One witness to this final gruesome scene of a particularly bloody insurrection was 17-year-old Augusto Sandino, who later cited the event as awakening his own national consciousness (Gobat 2005: 118).

The U.S. then forced the Nicaraguan state to hand over its national financial system to North American economists, who pursued a strict policy of austerity in an attempt to create a stable currency that would attract U.S. investment (Bermann 1986: 172, Gobat 2005: 125). This marked a turning point in U.S. foreign policy as its expanding empire moved from one of territorial expansion to economic hegemony (Bermann 1986: 172). Following the global economic depression of 1920-1921, this form of 'dollar diplomacy' poured millions of dollars into public improvement projects throughout Latin America in order to modernize infrastructure and globalize economies (Gobat 2005: 127). Not so in Nicaragua where economic fluctuations were equated with political instability. In Nicaragua, where the National Bank was being controlled by Wall Street, large-scale agroexport producers could not procure the loans necessary to upkeep their coffee haciendas that depended on sizeable inputs of seasonal manual labor (Gobat 2005: 133). The U.S.' stranglehold on Nicaragua's financial system served to weaken the economic power of the country's elites, as the resiliency of small- and medium-scale farmers allowed the rural economy to at least grow if not modernize (Gobat 2005: 151). This was due in part to the fact that, though large coffee barons were unable to

procure large loans from the National Bank, still local private moneylenders were more than willing to accept mortgages for loans as small as US $24 (Gobat 2005: 160-161). In this turn of events, some small- and medium-scale producers were even able to buy considerable parcels of land from large landowners who were approaching insolvency. All this occurred in Nicaragua both in contrast to and partly as a result of 'modernization' efforts in neighboring Latin American countries.

As the "dance of the millions" propped up agroexport producers of coffee, bananas, and sugar in other parts of Latin America, human capital was drawn into plantation estates and away from those countries' rural economies (Gobat 2005: 154). Since local demand for meat, dairy, and grains was far higher than for coffee, most Central American countries were forced to import basic provisions from abroad, i.e. from the U.S. and Nicaragua (Gobat 2005: 154). In Nicaragua, where loans were denied to large agroexport producers, cattle and grains again became the country's most profitable industries, taking advantage of the overland and water trade routes that had been utilized since the 16th century (Gobat 2005: 157). Though the Nicaraguan state was denied funds to enhance its own domestic transportation infrastructure, the cattle and corn produced by the non-elite sector of Nicaraguan society was able to benefit from improved infrastructure elsewhere on the isthmus once over the national border (Gobat 2005: 158). Eyewitness accounts testify to this unintended boon in the rural economy. A U.S. consul observed in 1925 that "some of the large holdings have diminished, but there has been an increase of breeding among the small farmers (Gobat 2005: 170)." Though military records of the decades-long U.S. occupation of Nicaragua are scant and mostly quotidian, at least one U.S. troop stationed in the northern province of Segovia commented that "one sees nothing but fields of corn and rice besides many cattle (Gobat 2005: 153)."

This is in spite of a lack of 'modernization' within Nicaraguan agriculture. Contemporaries criticized Nicaraguan agriculturalists in the 1920s

for their lack of use of chemical fertilizers, and other agricultural imports into Nicaragua were by far the lowest in Central America (Gobat 2005: 154-155). It could be claimed that the twenty years prior to the advent of dollar diplomacy were the most profitable that Nicaragua's export economy had yet witnessed, and that the twenty years after were among the least profitable; but that does not mean that every sector of Nicaraguan society was so hard hit as the large-scale landholders. At a time when large-scale loans were scarce in Nicaragua, the rural peasantry seems to have been empowered at the expense of the elite-controlled agroexport sector. The enhanced leverage of the rural peasantry enabled them "to resist elite appropriation of their land and labor (Gobat 2005: 174)," and in turn traditional non-chemical agriculture flourished for the time-being.

The urban centers of the country had a far different experience. Political stability was not achieved as a result of the presence of the U.S. Marines. In fact, at least ten revolutionary uprisings were attempted between 1913 and 1924 (Bermann 1986: 176). The ramifications of long-term military occupation were manifesting themselves more commonly by the 1920s in the form of brawls and other incidents (Bermann 1986: 176). Racism on the part of the all-white U.S. Marine force is likely also to have taken a toll on cultural relations, one U.S. commander in particular stating in a condescending manner: "Being of a mixture of Latin and Indian blood, they are rather tumultuous, and they seem to enjoy…civil disorder in much the same spirit as we take football (Gobat 2005: 257)." Skirmishes, conflicts, and their aftermaths may have prompted one resident of the Cantimplora community of Belén to claim that "*the marines took everything: the gold, the deer, the rattlesnakes and even the turkeys which then come back in tin cans* (CANTERA 2006: 109)."

To make matters worse, an earthquake struck Managua in 1931, virtually destroying the city (Bommer 1985: 270, Gilbert 1994: 56). Through the course of the U.S. occupation, quasi-democratically elected Nicaraguan

presidents were seemingly only at will to attempt those things which were approved by various customs and taxation officials who were appointed by U.S. bankers and the U.S. State Department (Bermann 1986: 183). U.S. intervention had created an ineffectual Nicaraguan government that was dependent on a North American police force created out of a conveniently erroneous reading of the Monroe Doctrine. Knowing that their continued economic intervention was not achieving the desired outcome of political stability, the U.S. formed a new plan to achieve stability through a military proxy, namely the *Guardia Nacional*.

11. El viejo sandinismo

Already as of 1924, U.S. policymakers in Nicaragua were pushing for a "non-political constabulary" force to ease the withdrawal of active U.S. Marines from Nicaragua (Bermann 1986: 179). This idea became a reality in tandem with an increased militarization of the U.S. occupation following the suppression of a civil war spanning 1926 and 1927 (Gobat 2005: 216). The *Guardia* was originally intended as a force that would aid the marines as they went about their newly stated task of dismantling *caudillismo,* an entrenched system of rural socio-political bosses, in the Nicaraguan countryside (Gobat 2005: 216). The scope of the *Guardia*'s mission was soon enlarged, though, to combat a group of insurgents who had refused to lay down arms following the civil war. This group of insurgents, holding out in the mountainous northern region of the Segovias, was led by the same Augusto Sandino who had watched General Benjamín Zeladón's corpse dragged through town following his refusal to lay down arms in 1912.

Waged over the next six years, the war against Sandino converted the *Guardia* into a large, well trained, well outfitted, and expensive armed force (Gobat 2005: 216). By the time of the U.S. Marines' withdrawal in 1933, the *Guardia* was ostensibly Nicaragua's strongest state institution, consisting of over 5,000 soldiers and absorbing almost 25% of the government's expenditures (Gobat 2005: 216). What's more, *Guardia* troops had accompanied U.S. troops in their forced dismantling of *caudillismo,* in their policing of rural polling places, and in their distributing of food and vaccinations, particularly after the Great Depression of 1929 (Gobat 2005: 216-217). In this way, the *Guardia* assumed a considerable amount of political capital at a time when the Nicaraguan conservative elites were losing theirs. With the dismantling of *caudillismo* came the erosion of oligarchic rule, after the elites' economic influence had already been diminished by the lending policies of dollar diplomacy (Gobat 2005: 231). Many conservative

elites came to believe that the only way to preserve a semblance of their hegemony would be through an authoritarianism that tended toward fascism.

A new conservative political party, the *Partido Trabajador Nacionalista*, went so far as to publish in a local newspaper such a statement as "The dictatorship of selected men is not only desirable but urgent… The Dictatorship is the indispensable instrument for all thoroughgoing renovations, and with it we will create the 'New Nicaragua' (Gobat 2005: 260)." This new party even called for "the Republic to be organized like an army of work, ready to be transformed into an Army of War whenever the National Defense demands it (Gobat 2005: 261)."

Conservative oligarchs at first sought out a political agreement with Sandino. While both of these forces held in common a staunch opposition to North American interests in Nicaragua and a general agrarian vision for the country, these visions contrasted sharply in their details. While conservative oligarchs held in esteem the traditional, cattle-based hacienda system that had generated their wealth in the first place, Sandino called for a redistribution of state-owned lands to the peasantry and the empowerment of the popular sector in general (Gobat 2005: 255). In the end, these contrasting views did not have the opportunity to find middle ground since on February 21, 1934, Sandino and four of his generals were arrested and soon afterwards assassinated by a *Guardia Nacional* patrol as they were leaving a dinner at the Presidential Palace (Brás 1994: 24).

Responding to the conservative oligarchs' call for authoritarianism, the director of the *Guardia Nacional*, Anastasio Somoza García, was by 1937 the military dictator of Nicaragua, a post he would maintain for the next 20 years (Brás 1994). Somoza's *coup d'état* of a democratically elected government was openly supported under the U.S.' new 'Good Neighbor' policy of non-interventionism (Solaún 2005: 17); hence the very institution that had spent decades occupying Nicaragua in order to ostensibly promote democracy was now openly supporting its authoritarian military dictator. In the words of then

U.S. Ambassador, Arthur Bliss Lane, "The people who created the [National Guard] had no adequate understanding of the psychology of the people here… In my opinion [U.S. institution-building] is one of the sorriest examples on our part of our inability to understand that we should not meddle in other people's affairs (Solaún 2005: 32)."

…

Summary of Part II: Independence

Nicaragua's independence came at a price to its cattle and cowherds, as revolution after revolution brought with it an open slaughter of cows for meat and an open draft of peasants for soldiery. William Walker's 1855 invasion brought additional slaughter and disease with it, as well as the firm stamp of U.S. involvement in Nicaraguan politics. The thirty years of relative peace following Walker's departure brought a general rebuilding of cattle ranching in the country. At this time, new drought-resistant African grasses were introduced for fodder, and new cattle breeds, such as the Zebu and the Reyna, became more present in Nicaraguan herds.

Nontraditional crops, such as coffee and bananas, also became entrenched in the Nicaraguan agricultural sector, as a new class of businessmen sought to cater to North American and European consumer tastes. General José Santos Zelaya seized national authority in 1893, and introduced a series of initiatives to build up the agroexport sector, including subsidies, modernization of infrastructure, and the sale of enormous tracts of land to foreign producers. Zelaya also pushed heavily to secure a U.S.-funded interoceanic canal for Nicaragua. When that deal fell through, Zelaya's outspoken political rhetoric and nationalistic sentiments provoked a severe reaction from the U.S. military: full-scale invasion. Before the U.S.' 24-year occupation was out, the rebel guerilla leader Augusto Sandino had become a revolutionary hero for many Nicaraguans, a status his legend enjoys up to the present day.

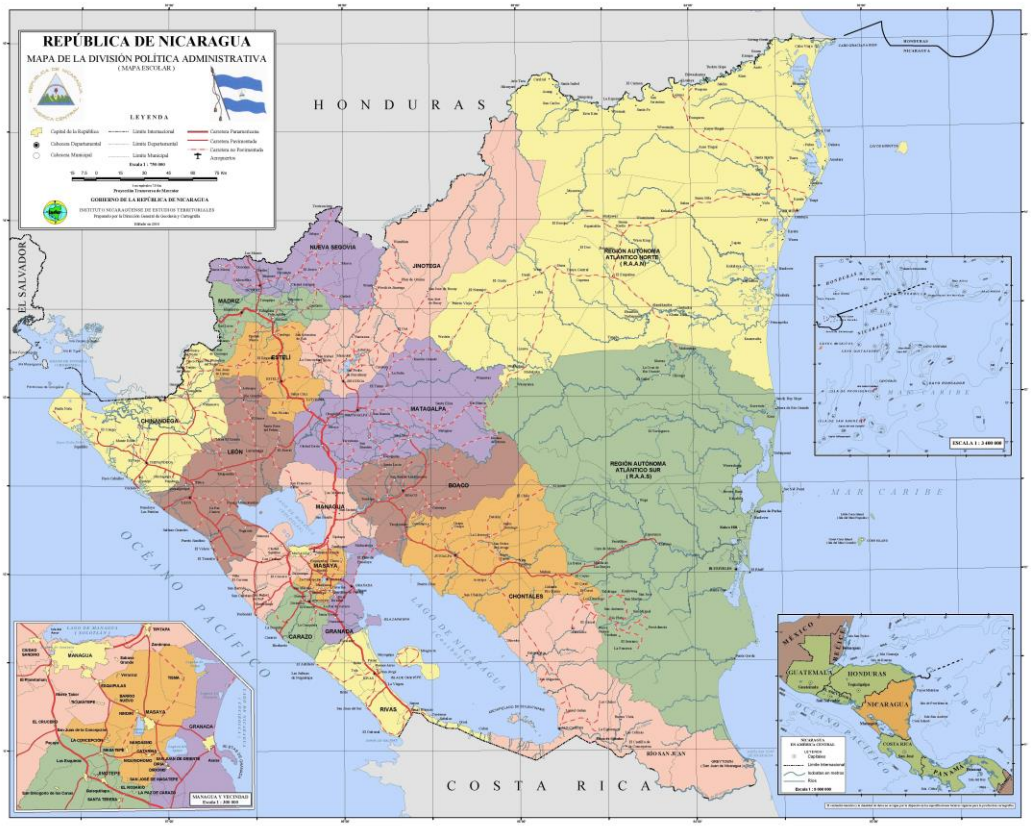
What did all this political upheaval mean for the state of cattle-ranching in Nicaragua as of the early 20th century? A number of strains of thought entered into the contest for what would become the hegemonic ideology of Nicaragua in the span of decades between 1890 and 1930. We see the advent of the modern agroexport model introduced by Zelaya at the end of the 19th century, one that viewed nature as a resource to be exploited in a utilitarian manner in order to maximize the country's human development, viewed distinctly from its natural development (Gudynas 2010: 273). This natural development was to be a controlled 'experiment' of sorts by way of scientific conservation of resources such that these resources would continue to exist for future generations to exploit as well, hence Zelaya's *Law concerning Conservation of Forests*. At this point, it could be said that the rational management of cattle in relation to forest was being exhorted if not institutionalized. Nevertheless extensive cattle ranching within the large-scale hacienda system remained the predominant model.

By the time of full-scale U.S. intervention in the politics of Nicaragua, starting in 1909, the exploitation of natural resources for export was still present to be sure, but had shifted practitioners from the large landowners whose capital inputs had been subsidized previously by the *Banco Nacional* to the small and medium-scale producers who advantageously filled a gap left by these subsidizations no longer being available to the elite. The policies of dollar diplomacy in Nicaragua inadvertently provided an opportunity for redistribution of wealth that would not have been possible in an elite-controlled era of national development. Utilization of natural resources within limits by small and medium-scale producers was still the driver of this informal economy of cattle and corn exports, but not to the exploitative extent that coffee and banana planters in neighboring countries reached under the liberal lending policies of North American banks. These coffee and banana plantations expanded in Honduras and Costa Rica at the expense of domestic grains and cattle, producing the aforementioned opportunity for export by

Nicaraguan producers who were still utilizing generations-old trading routes that moved goods overland and over water. In this way, local knowledge systems regarding cattle management prevailed for this short period at the beginning of the 20th century as a direct result of the temporary inability of the large landholding elite to suppress them.

While Sandino may have supported and applauded this particular inadvertent manifestation of U.S. involvement in Nicaragua, he was nevertheless staunchly opposed to the occupation in general, a view he shared with Conservative oligarchs. Both valorized their own kind of agrarian model of national development, though Sandino's was of a communistic egalitarian sort while the Conservatives' was based more on the hierarchical colonial-based system of the concentration of power through large landholdings justified by extensive cattle ranching (Gobat 2005: 255). With the rise to power of the Somozas, the Conservative model (in a Liberal guise) would become the sole hegemonic model of national development. This model would be one that invoked the colonial hacienda system, but in a thoroughly modernized fashion, with the maximization of exploitation of natural resources to benefit just one family at the expense of small and medium-scale producers throughout western Nicaragua.

Part III: Intervention



2010 map of the political divisions of the Republic of Nicaragua, courtesy of the Nicaraguan Institute of Territorial Studies (INETER)

12. “Estamos perdiendo toda la montaña” (CANTERA professional, Belén, 8/11/2011)

Upon taking power, Anastasio Somoza García embarked on a ‘business-as-usual’ line of governance. Employing the oligarchical model of authoritarianism, Somoza himself set about reinforcing the hacienda system by his own example. He ‘persuaded’ many landowners to part with their lands at reduced values at the same time as he enforced a mandatory 5% tax on all civil servants’ salaries to be deposited into his own coffers (Crawley 1984: 97, Solaún 2005: 40). In effect, Somoza treated the Nicaraguan state “as his own personal farm (Solaún 2005: 34),” and the *Guardia* as his own personal police force. The Somoza dynasty at first received considerable public support, in large part due to the relationship it had held with U.S. Marines in their welfare programs of the 1920s (Gobat 2005). Somoza utilized this support to mobilize peasants on his behalf as he usurped land from ‘anti-Somoza’ landlords, in many cases Conservative oligarchs (Gobat 2005: 272). His support was rooted in the colonial *patrón/peón* relationship, as he promoted a populist philosophical rhetoric without ever truly initiating any kind of improvement of the standard of living or basic services for the majority of the Nicaraguan population living as agricultural *peones* (Faber 1993, Solaún 2005: 40).

Somoza’s expansion of the cotton industry, ‘white gold’ as it has been called, began in the midst of World War II, and continued until well after his assassination in 1956 into the rule of his sons, Luis Somoza Debayle and Anastasio Somoza Debayle. This expansion entailed the forced relocation of many thousands of peasant families from the León and Chinandega plains of the Pacific Coast, pushing the boundaries of the agricultural frontier further east within the Central Highlands (Levard and Marín 2000: 12), and pushing populations and their cattle further upslope to areas that are not ideal for agriculture (MIDINRA 1984: 26, Faber 1993: 132). This has since caused additional soil erosion, fertility loss, and flash floods, which account yearly for

a considerable amount of destruction of crops, property, and lives. Some displaced families either entered into semiservile work on the cotton plantations (MIDINRA 1984: 13), or else migrated to the cities, particularly Managua, which experienced a marked population increase from 39,000 in 1906 to 275,000 in 1963 (Radell 1969: 236).

As of the 1950s, Somoza García, then his son Luis Somoza Debayle, embarked on a large-scale technological modernization of the Nicaraguan agroexport industry in order to be able to profitably engage in peacetime production (Radell 1969: 240). Though cotton had been sustainably cultivated in western Nicaragua since well before the arrival of the Spanish conquistadors, the industrial expansion of the cotton industry, and of the agroexport industry in general, initiated the expansion of agrochemical use as well, with far-reaching ecological and societal ramifications. In the words of James C. Scott, "The utilitarian commercial and fiscal logic that led to geometric, monocropped, same-age forests also led to severe ecological damage (1998: 309)." Areas on the Pacific Coast which were once forested, pastureland, or sown with fruit trees were converted into monoculture plantations of cotton, with destructive effects on the fertility of the soil (Levard and Marín 2000: 12). From 1950 to 1967, land under cotton cultivation went from 16,600 hectares to 153,800 hectares, about half of which had previously been forest or pasture but was now opened up by new roads and governmental incentivization programs (Radell 1969: 243).

In the 1950s, the plains around León were essentially a "laboratory for pesticide experimentation," resulting in dozens of deaths and hundreds of illnesses (Faber 1993: 93). Pesticide residues, accumulated over the course of decades, have resulted in significant declines in the populations of a number of migratory bird species, such that the "sight of dead birds along mangrove channels is common during the cotton spraying season (Faber 1993: 108-9)." The use of agrochemical fertilizers has by 2012 spread into nearly every small farm in western Nicaragua, with still uncertain effects on the population as a

whole, though an epidemic of kidney failure is presently an issue of concern to medical professionals in Nicaragua and El Salvador (Aleman and Weissenstein 2012: 13A).

Sugar cane had been a small-scale domestic crop in Nicaragua since the early days of the Spanish invasion, but this too was set on a course of industrialization by Somoza. The majority of sugar produced in Nicaragua is for domestic consumption, though exports to the United States did increase significantly following the imposition of the U.S. import ban on Cuban products in 1959 (Radell 1969: 247-9). Production of white centrifugal sugar tripled over the next two decades, as dictated by foreign demand (Annis 1994: 130). The Dolore sugar factory, later renamed the Benjamín Zeladón sugar factory, was founded in the town of Potosí in 1940 (García 2012), followed the next year by the construction of the Pan-American Highway cutting through the Rivas isthmus (CANTERA 2006: 74). To the present day, this factory is the primary source of employment in the towns of Belén and Potosí, but it may also be one of the primary sources of illness in the area. After decades of agrochemical spraying by means of airplanes, reports of illnesses from workers at the factory and its plantations are common and widespread.

The effects of these practices on the ecology of Lake Nicaragua, upon whose shores the factory is built, is a matter that requires further investigation; but a nationwide study conducted in 1981 found that 75% of the country's water sources were contaminated by agricultural run-off and an additional 25% by "highly toxic industrial contaminants (Faber 1993: 168)." Between 1968 and 1981, the U.S. corporation Pennwalt was permitted by the Somozas to dump an estimated 40 tons of mercury into Lake Managua (Faber 1993: 54). Cattle have been known to die from drinking water downstream from industrial plants, and the effect on human life is well-documented as well. In the 1970s, Nicaragua garnered the inauspicious title of most pesticide poisonings per capita in the world, with approximately 400 deaths per year (Miller 2007: 208). Today only one of dozens of lagunas within the

Managua/Masaya urban zone is considered swimmable, though some still remember swimming as children in Managua's central Laguna de Tiscapa, an act almost unthinkable in the present day.

The 1959 Cuban Revolution had a number of additional effects on the state of the government-society relationship in Nicaragua. It fomented domestic stirrings of revolution, manifested in the founding of the Sandinista movement in 1961. Peasant protests in León and Chinandega provoked the establishment of the National Agrarian Institute and the passing of the Agrarian Reform Law of 1963, which ultimately granted land to a meager 604 untitled families (Solaún 2005: 59). The Cuban Revolution also elicited the formation of the 'Alliance for Progress' initiative of the Kennedy administration of the U.S. (Solaún 2005: 56-65). This meant an increase in foreign financial and technical assistance via institutions such as USAID and the World Bank (Solaún 2005: 56), the widespread effects of which have been widely criticized in academic literature for its promotion of economic dependency (cf. Faber 1993: 47, et al.). Another unfortunate consequence of increased financial aid in Nicaragua was the misappropriation of funds by members of the *Guardia Nacional*, a trend that would have a large part to play in the Somoza dynasty's undoing. As *Guardia* officers began to acquire significant tracts of land and convert these lands to agroexport products, the rural sector that had initially supported the Somozas came to view them as just the next in the line of landlords who profited off of their labor, forcing them to remain in a state of perpetual subsistence (Faber 1993: 55, Gobat 2005: 273-274).

With the help of increased funding from the United States and multinational agencies, the Somozas also increased the total amount of roads in Nicaragua by over 4,000 kilometers between 1950 and 1960 alone (Radell 1969: 199). This, along with the 1957 opening of the *Matadero Modelo* in Managua, Central America's largest meat-packing plant, radically changed the face of cattle ranching in the country (Radell 1969: 253, Kaimowitz 1996: 25).

Up until that time, cattle had been driven on the hoof to be sold at markets domestically or in neighboring countries as distant as Guatemala; or else only a cow's tallow and hide were exported to overseas markets (MacLeod 1973). With a capacity to process about 400 head of cattle a day, the daily truck haul to Managua was made possible, even from relatively remote locations such as Muy Muy in the dry summer months (Radell 1969: 253). Prior to the US Meat Import Act of 1964, there were almost no restrictions on beef imports (Kaimowitz 1996: 25); and Lanica Airlines, owned by the Somoza family, was filling its extra cargo space on passenger planes to Miami with processed, chilled beef (Radell 1969: 254). Incentivized by rising international beef prices, financial support from the Inter-American Development Bank and the World Bank (Faber 1993: 121), and a growing demand particularly in the United States, national beef exports rose from 9,671 kilograms in 1960 to 74,927 kilograms in 1979 (MIDINRA 1984: 21). By the time of the Sandinista Revolution, deboned frozen beef had regained the position of being Nicaragua's most significant export (Faber 1993: 50).

Such industrialization of the cattle industry, and of other agroexport commodities, subsidized by the U.S.'s Alliance for Progress, did not in the end bring about either a reduction in Nicaragua's national debt, or an improvement in the country's average standard of living. By 1979, Nicaragua was "one of the world's most indebted nations per capita," with a foreign debt of U.S. $1.2 billion (Bermann 1986: 249). The Somoza government had usurped 80% of Nicaragua's prime farmland in the cotton boom of the mid-1950s, translating in an overall decline in the agricultural workforce from 60 to 44% of the population, as dispossessed families crowded into the outskirts of Managua and other major cities in search of employment (Bermann 1986: 249-250). Though Nicaragua's economic growth rate was high in the early 1960s, the global economic recession at the close of the decade jeopardized much of the urban industrial infrastructure that had already been built (Bermann 1986:

249). In Managua alone, 292 factories are reported to have closed their doors between 1969 and 1974 (Bermann 1986: 249).

In the same period, the area of the country under pasture rose from 1,896 hectares in 1960 to 4,676 hectares in 1979 (MIDINRA 1984: 21), a substantial portion of which was owned by members of the Somoza family itself (Faber 1993: 127). Along with this came a substantial amount of deforestation of old-growth woodlots, as large landowners and *Guardia* officers continued to displace small farmers and then cheaply rent out unutilized tracts of land on the condition that the renters would remove forest cover, sow basic grains, and convert the land to pasture once the soil's fertility declined (MIDINRA 1984: 22, Kaimowitz 1996: 22). Deforestation was achieved in a more overt manner by companies such as the U.S.-owned Nicaraguan Long Leaf Pine Company, among others, who harvested massive tracts of commercial timber throughout the country from the 1950s into the 1970s (Miller 2007: 208). It was at this time that the El Bosque community of Muy Muy was almost completely deforested.

In the past, the criollo cattle had been utilized as an all-purpose animal, providing meat, milk, and draught power; but with the construction of the Matadero Modelo and the new Prolacsa milk factory in Matagalpa, among other new pieces of infrastructure, an increasing specialization of breeds was becoming prioritized. In an attempt to improve the quality of meat exports, the Zebu-related breeds, American Brahman and Santa Gertrudis, both of which had not long since been developed in Texas and were already adapted to tropical climates, were introduced into Nicaragua's herds (Rouse 1977: 173). European dairy breeds, such as Jersey, Brown Swiss, also known as Pardo, and later Holstein-Friesian, were also introduced and often crossed with the native Reyna or Criollo breed in order to acclimatize them (Rouse 1977: 172-3). New techniques for handling the cows were introduced as well, such as vaccines, medications, nutritional supplements, and artificial insemination, in addition to more drought-resistant African grass species (Faber 1993: 122).

Matagalpa, with an amenable climate, a road that had connected it to Managua since 1922, and now a new milk-processing factory, had by the mid-1960s emerged as one of the country's primary cattle regions (Faber 1993: 126). For this reason, large landowners and the *Guardia Nacional* continued to evict agricultural peasants and convert their farms to pasture (Faber 1993: 126). The Somoza dynasty, though, underestimated what they could exact from the peasantry before they would "vigorously resist (Scott 1998: 24)." In 1967, the Sandinista movement came to the aid of the displaced family farmers, and the Sandinista National Liberation Front (FSLN) became an active military organization (Faber 1993: 126, Brás 1994).

The 1960s and 1970s also witnessed the formation of the *Mercado Común Centroamericano*, which together with certain international organizations sought to exhort state intervention in the agricultural sector throughout Central America with the intent to promote modernization without exhausting natural resources (Kaimowitz & Murrar 1997: 259-260). The first significant manifestation of this new extentionist movement was the Plan Puebla initiated in Mexico in 1967 with the designed purpose to increase food security and social well-being within an already existing farming system (Berdegué 2000: 261). Plan Puebla was followed by additional research projects in Colombia, Perú, and Honduras, and ultimately by the formation of the Tropical Agricultural Research and Higher Education Center, or CATIE, in Turrialba, Costa Rica, in 1973 (Kaimowitz & Murrar 1997: 261, Berdegué 2000: 263-264). With a heavy interdisciplinary emphasis, CATIE and its emulators would become instrumental in the incentivization of mixed-use agricultural systems throughout Latin America; though its direct influence in Nicaragua would yet have to wait out additional political and social upheaval.

In 1972, a massive earthquake struck Managua, destroying 75% of the city's buildings (Bommer 1985: 270, Solaún 2005: 79). At this point, the national trend towards urbanization had augmented the city's population to five hundred thousand, twenty thousand of whom died in the quake (Bommer

1985: 270-273). International aid funds poured in, ultimately amounting to U.S. $57 million, only $16 million of which was ever accounted for (Bommer 1985: 273-274), making the governmental kleptocracy more apparent than ever (Solaún 2005: 79). A general lack of cohesion reigned in a city in which any collective organization had been viewed as subversive for the past 30 years (Bommer 1985: 270). The *Guardia* was granted emergency powers in the wake of the disaster, which resulted in an officer-run black market of stolen goods and medical supplies (Bommer 1985: 271, Solaún 2005: 79). All in all, the transparency of corruption that was apparent in the earthquake's aftermath proved to be a tipping point even among the small group of Nicaraguan businessmen still loyal to the Somoza dynasty (Bommer 1985: 274, Solaún 2005: 79).

General Anastasio Somoza Debayle, the third in the line of family strongmen, even after the earthquake continued to usurp National and private business interests to his own ends. His monopolization of earthquake reconstruction funds alienated the business community (Bommer 1985: 274), while his concentration of land for the sake of "agricultural capitalist development" alienated the rural poor who continue to be pushed into the cities (Solaún 2005: 85). Somoza's political opposition was given light of day by the initiation of the human rights policy of Gerald Ford's U.S. administration, then by the continued unsupportive policies of the Carter administration (Solaún 2005: 83-88). The unarmed opposition's main voice was the daily newspaper *La Prensa*, edited by Pedro Joaquín Chamorro who had also formed a coalition of unarmed oppositionists into the *Unión Democrática de Liberación* (UDEL) in 1974 (Solaún 2005: 81). Chamorro was assassinated in January 1978, eliciting outrage from all strata of society, elite and poor, young and old (Solaún 2005: 88). Politically deprived members of the social elite actively joined the Sandinistas, as others passively withdrew their support from the Somozas (Solaún 2005: 66). As so often has occurred in Nicaragua's history, dramatic change was on the horizon, and the Sandinistas

successfully overthrew the Somoza dictatorship, assuming control of the government on June 19, 1979, after 43 years of Somoza family rule (Brás 1994).

13. “Nicaragua es una escuela” (Collins 1985: 2)

The Sandinistas inherited a country in ruins. An estimated 50,000 Nicaraguans had died in the course of the rebellion, and an additional 120,000 had fled to neighboring countries, many taking their cattle herds with them (Brás 1994, Edelman 1995: 29). Half of the country’s land was owned by just 1% of the population (Collins 1985: 2), and 20% of the country’s most fertile farmland was owned by the Somoza family itself (Faber 1993: 151). Though dominating national agroexport production, the cattle sector was also in serious crisis and was not aided by more stringent restrictions on beef imports into the U.S. that went into effect in 1979 (Edelman 1995: 27-9). Due to currency deflation, export taxes rose significantly, while the costs of fencing material, vaccines, and nutritional supplements also rose (Edelman 1995: 30-1, Kaimowitz 1996: 27). The era of the capitalist accumulation model was, for the time-being, over. In reality, this model had throughout the first three-quarters of the 20th century only benefitted the 1% of the Nicaraguan population that owned half the country’s land, possessed the capital to invest in infrastructure and improved cattle breeds, and could transport their cows to Managua by truck. The “export boom” had much fewer beneficial effects on the small-scale ranchers who sold milk and old cows for slaughter (Kaimowitz 1996: 26). In an attempt to rule according to the “logic of the majority (Close & Martí i Puig 2012: 7), more pressing on the new Sandinista government’s list of immediate priorities was the welfare of the other 99% of the population, who might own a few head of cattle as a small-scale investment for local consumption of milk and cheese. To the Sandinistas, extensive cattle ranching, which had been a primary form of economic activity since the earliest days of the Spanish invasion, was itself a symbol of the historic exploitation of natural resources and oppression of the working class (MIDINRA 1984: 4-5, Neira 1988: 72). This interpretation was bolstered by the fact that by the 1970s, “10

out of 11 million acres used for export production [in Nicaragua] were being devoted to cattle grazing (Collins 1985: 15).” Therefore one of the Sandinista’s first acts in power was the implementation of a revolutionary Agrarian Reform Law in 1979.

This reform primarily involved the nationalization of all landholdings of the Somoza family and those associated with the Somoza family, totaling over 20% of Nicaragua’s arable land (Brás 1994). Almost 40% of those farms amounting to greater than 500 manzanas (352 hectares) were also confiscated by the Sandinista government (Neira 1988: 71). With the threat of expropriation looming, some large-scale ranchers attempted to run down their assets by “not replacing their bulls, neglecting their pastures, or slaughtering cows of reproductive age (Kaimowitz 1996: 30).” Otherwise, the newly acquired governmental lands were converted into cooperatively owned state ‘companies’ as of the 1981 *Law of Creation of the Companies of the Agrarian Reform* (Ortega 1983: 8), a kind of “state-centered accumulation” model (Spalding 2012: 216). These companies specialized in the typical product of the geographical area in which they were situated, thus the Héroes y Mártires de Pán Casán project, located in the vicinity of Muy Muy, in effect created what came to be known as the *ruta de la leche* (route of milk) between Muy Muy, Matiguás, and Río Blanco. In the vicinity of Belén, the Dolore sugar factory was nationalized as a state business and renamed the Benjamín Zeladón sugar factory.

The Sandinistas also modified the national banking system in order to improve access to credit for small-scale agricultural producers and their domestic cash crops (Spalding 2012: 216), increasing the amount of credit available by over 600% (Colburn 1989: 185). Considering the prevalence of private ownership of facilities to process these raw goods, though, the Sandinistas also sought to incorporate private enterprise into the national economy in a kind of “mixed economy” that was as dependent on the agroexport industry as ever (Close & Martí i Puig 2012: 5, Spalding 2012:

216, Baumeister 2012: 249, 264). Despite these measures, the Sandinistas' emphasis on collective agriculture had some negative effects on the agricultural output of medium-sized producers who lacked a political voice, but held considerable economic weight (Baumeister 2012: 250-251). This discrepancy was addressed by the formation of the National Union of Farmers and Ranchers (UNAG) in 1981, an entity that would have been violently suppressed under the Somoza dictatorship (Baumeister 2012: 250).

Emphasizing political participation by the poor and marginalized, the Sandinistas initiated programs (most famously the literacy campaign) to build up the nation's human capital and to "offset historic advantages of the wealthy and privileged (Close 1999: 4)." This resulted in the emergence of well-organized civil society organizations, such as UNAG, who would become an independent and influential pressure group by the late 1980s and into the present day (Close 1999: 19). These newly formed organizations would be increasingly supported by European governments and non-governmental organizations from Germany, France, Holland, and the Nordic countries (Kaimowitz & Murrar 1997: 262).

On the ecological side of the spectrum, the Sandinistas have been heroized by some as the 'liberators of nature' espousing a "revolutionary ecology (Faber 1993: 154)." The actual course of events is not so straightforward. The Sandinistas did at first try to regulate the import of particularly harmful pesticides, such as DDT (Faber 1993: 171), and they did nationalize the country's mineral, forest, and aquatic resources, cutting off the extractive industries of some foreign companies (Miller 2007: 208); but they also disseminated the technologies of the so-called 'Green Revolution,' including modified seeds, chemical fertilizers, and mechanized farming practices with machinery for the most part donated from Eastern bloc countries (Neira 1988: 73, Levard and Marín 2000: 12, Baumeister 2012: 250-251). All of these developments led small farmers to become more dependent on imported agroindustrial products as opposed to local resources and knowledge

(Neira 1988: 73, Levard and Marín 2000: 12). In this way, the Sandinistas were still conceptualizing nature as a resource to be maximally exploited for the sake of human development (Gudynas 2012: 273).

The Héroes y Mártires de Pán Casán project was implemented in the early 1980s with the collaboration of Cuban agricultural extensionists. Already a prime cattle region of Nicaragua, Muy Muy was earmarked for the production of milk as well by introducing the Holstein-Friesian and Pardo Suizo races and crossing them with Reyna and Criollo cattle for the sake of acclimatization. Estrella, or star grass (*Cynodon dactylon*), was also introduced at this time. Though adults in Nicaragua do not generally drink milk themselves, small-scale cattle ranchers who had just received titles to land as a result of the revolution saw the economic potential of commercial milk production and the '*doble-proposito* (dual-purpose)' cow soon became the *modus operandi* of the region. Many large-scale landowners in this area were forced to sell their land to the government at well-below market rates, and they today accuse this project of having been the cause of rampant deforestation of old-growth woodlands in the area. Historic aerial photographs tell a different story. It is true that as of 1947 this area was indeed an extensive forest with very few roads cutting through it, but evidence of deforestation is obvious already by 1958. By 1970, the road north of town is much improved and the land alongside it and along the Río Grande de Matagalpa has little to no tree cover. As of 1981, the process of deforestation in this area is well advanced, but by no means the direct result of the Héroes y Mártires de Pán Casán project. (Aerial photographs courtesy of Archivo Técnico, INETER)

The internationally supervised, democratic elections of 1984, which legitimized rule by the Sandinistas as a political as opposed to military entity, marked perhaps the first ever honest and democratic elections in Nicaragua. Nevertheless the outcome of this election was combatted by the U.S., the very country who had occupied Nicaragua for almost three decades, attempting unsuccessfully to implement honest and democratic elections there. Nearly all

the Sandinistas' efforts at socioeconomic transformation were put on hold by an increasingly violent civil war, provoked and funded by the Reagan administration of the U.S.A. As the U.S. pumped nearly U.S. $1 billion into the war effort in Nicaragua, the Sandinista government was forced also to divert much of its budgetary spending toward defense (Faber 1993: 174). 37% of government expenditures in 1983 went toward the war effort, then 50% by 1985, effectively crippling domestic social reform efforts (Spalding 2012: 218).

As of 1985, U.S. President Reagan imposed a full trade embargo on Nicaragua, terminating the flow both of meat out of the country to the U.S. and of agricultural goods, such as fencing wire, vaccines, and supplements, into the country from the U.S. (Kaimowitz 1996: 27). This coincided with a North American trend against Central American meat as a result of the popularization of Norman Myer's 1981 "hamburger connection" theory of tropical deforestation (Kaimowitz 1996: 29). In response, Nicaragua began to export live cattle to Mexico and frozen meat to Canada, but regardless the country's agroexport economy fell precipitously as inflation rose (Kaimowitz 1996: 28, Baumeister 2012: 288). Due to war, market fluctuations, pressure from environmental groups, and the withdrawal of agricultural subsidies, among other factors, the expansion of Nicaragua's cattle industry was at a standstill by the mid-1980s (Szott et al. 2000: 1). By the close of the 1980s, Nicaragua's national economy had shrunk by 14%, its agricultural production by 13%, and its currency inflation had reached a remarkable 33,500%, as Reagan's economic and military stranglehold tightened (Close 1999: 27, Baumeister 2012: 251-252).

The civil war had other deleterious effects on the Nicaraguan countryside as *contra* soldiers targeted infrastructural, agricultural, and natural-resource-related projects, displacing some 250,000 peasants who fled conflict zones to towns such as Muy Muy, whose urban area increased three-fold at this time (AMUNIC/INIFOM 1997b: 3), or to cities such as Managua,

which was already struggling to provide health and human services to its growing population (Faber 1993: 177). Between 1979 and 1988, the urbanized population of Nicaragua increased by as much as 53%, while the more traditional systems of rural commerce were disintegrating (Neira 1988: 92). Some of those who stayed in the countryside and continued to work within the newly formed cooperative system of farming pooled resources to invest in cattle as a hedge against the rising inflation (Kaimowitz 1996: 30). However with limited state subsidization by the overextended Sandinista government, then a complete lack of support following the Sandinista's electoral loss in 1990, almost all of these cooperatives were forced to liquidate their assets, including livestock, ultimately leading to under-utilization or abandonment of pastures (Kaimowitz 1996: 30-39). Nicaraguan cattle herds numbered 2.5 million in the late 1970s, a number which dropped to 1.5 million by 1990 (Baumeister 2012: 253). Following this precipitous loss of livestock in the 1980s, by way of the civil war among other factors, there were an approximate 2 million hectares of abandoned grazing lands by the early 1990s (Szott et al. 2000: 7).

Natural disasters did not help the situation. May 1982 experienced exceptionally heavy rainfalls that resulted in flooding throughout the western and northern portions of Nicaragua (Bommer 1985: 275). 60,000 individuals found themselves homeless in the wake of these floods, but only 80 lost their lives, compared to 210 dead in Honduras where the floods were considerably less severe (Bommer 1985: 275). This has been credited to the high level of organization of the local rescue operations in a country that was already militarily mobilized (Bommer 1985: 275). International aid amounted to only 1.5% of the total damage that the floods had caused, and the U.S. did not contribute any aid funds (Bommer 1985: 276). October 1988 witnessed Hurricane Joan, which again resulted in the loss of much life and property in the southwestern portion of Nicaragua (CANTERA 2006: 38-46). So intense was the damage within the community of Chacalapa in the municipality of

Belén that inhabitants still speak of their town in terms of ‘before’ and ‘after’ the hurricane (CANTERA 2006).

14. El neo-liberalismo

After almost a decade of foreign-funded civil war, the Sandinistas lost their control of the central Nicaraguan government in 1990 to the U.S.-sanctioned National Opposition Union (UNO). By 1992, approximately 16,000 properties that had been redistributed by the Sandinista government were returned to their former owners (Faber 1993: 186). Lacking funds, cooperatives failed and were bought out by large-scale ranchers: in the case of Muy Muy by investors from Estelí and points north, in the case of Belén by investors from Nandaime, Granada, and abroad. A general return to large-scale extensive cattle ranching was experienced in Nicaragua in the 1990s, along with the resettlement of thousands of families in the country's interior (Levard and Marín 2000: 13). This meant the recovery of 240,000 hectares of abandoned pasture, but it also meant approximately 130,000 hectares of new pasture hewn out of the forested expanses of Nicaragua's humid eastern lowlands (Szott et al. 2000: 7-9).

The renewed deforestation of peacetime was a double-edged sword, as it was in large part carried out by a new class in Nicaraguan society unknown since the days of dollar diplomacy: the small independent farmer. In the years following 1985, the Sandinista government had begun to issue private (non-state) land titles to small-scale agricultural producers, many of whom had been able to retain possession of these lands following the 1990 political turn-over (Close 1999: 31). Additionally, the UNO after 1990 began the policy of distributing land grants from liquidated state cooperatives to individual, demobilized soldiers (Baumeister 2012: 252). Cessation of warfare in the countryside, and subsequent population growth into the present day (Dagang & Nair 2001: 52), has also meant that many of this new class of independent farmers have migrated to previously underpopulated areas where low-priced land and precipitation are abundant (Szott et al. 2000: 1). Some of these farmers brought their cattle and other livestock with them for a number of

reasons, including capital investment, insurance, transportation, traction, fertilizer, food, fuel, and social status (Szott et al 2000: 43, Roebeling 2003: 14). This is despite the fact that the fragile tropical soils of Nicaragua's eastern lowlands are far less suited for pasturage than the Pacific Coast, having little to no dry season (*invierno*) and having rarely ever been fire-managed by either native populations or later colonists of European descent. Referred to by Szott at el. (2000) as "The Hamburger Connection Hangover," cattle ranching and deforestation in Nicaragua were becoming more intimately connected in the wake of the country's third massive political overhaul in just over a decade.

Within the same time period as these demographic resettlements, the central Nicaraguan government steadily decreased in both size and engagement in the agricultural sector (Baumeister 2012: 262), resulting in a "drastic reduction in the scope of welfare provisions (Close 1999: 6)." At the behest of international stakeholders, such as USAID, the International Monetary Fund, and the Inter-American Development Bank, the Chamorro administration of Nicaragua followed a "market-friendly" economic reform that promoted privatization, trade liberalization, and neoliberal deregulation (Spalding 2012: 223, Baumeister 2012: 219-220). This left a vacuum in terms not only of agricultural extensionist work in the growing rural sector, but also in terms of the provision of basic services to the countryside (Spalding 2012: 235). The widespread notion was that a 'free' market would promote economic growth and reduce poverty levels nationally without any additional state intervention (Spalding 2012: 222).

As mentioned, Nicaragua's abandoned pasture lands were gradually recolonized through the course of the 1990s and a favorable export market opened up for milk, cheese, and beans, particularly to El Salvador. (Szott et al. 2000: 7, Baumeister 2012: 252). This meant an overall increase in national agricultural output, as Nicaragua gradually became self-sufficient in production of basic grains and the country's cattle herds rose back to pre-1979 levels (Szott et al. 2000: 7, Baumeister 2012: 252-253). But it did not mean an

increase in output per hectare nor a reduction in national poverty levels, as had been expected (Spalding 2012: 222, Baumeister 2012: 253). In fact, the National Statistics and Census Institute calculated in 1993 that the percentage of the population living in poverty had actually increased since 1985 (Spalding 2012: 221). As agricultural intervention by the Nicaraguan government shrank in the 1990s, so too did the credit available to small and medium-sized farmers. With international funders insistent on continued poverty reduction efforts, a cadre of nongovernmental organizations flooded the country and absorbed many of the former Sandinista government's extensionist functions in providing basic services, technical assistance, and credit programs (Baumeister 2012: 262, Spalding 2012: 235).

This new wave of international intervention coincided with two other significant phenomena in the realm of international relations: political and administrative decentralization of Latin American society generally and the ramifications of 1992's Earth Summit in Río de Janeiro. In Nicaragua in particular, 1990 marked the first time since the Spanish invasion of the 16th century that voters were able to democratically elect their own municipal councils (Kaimowitz et al. 2001: 281). Since 1990, municipal governments throughout Latin America have taken up such environmental issues as "logging, reforestation, protected areas, forest fire control, and land use planning (Kaimowitz et al. 2001: 279)." This trend toward decentralization is of course an auxiliary to the toppling of various dictatorships throughout Latin America. That decentralization resulted in greater attention paid to environmental issues, albeit within the 'business as usual' paradigm, is in part due to the ramifications of 1992's Earth Summit.

1987 saw the publication of the U.N.-convened Brundtland Commission's report *Our Common Future*, which popularized the term 'sustainable development' (Sachs 1999: 28) and which "irrevocably brought the notion of sustainability into the political and economic forum (O'Toole 2010: 10)." The Earth Summit of 1992 took this notion of sustainability and

attempted to institutionalize it by mandating its implementation among industrialized countries by means of the Convention on Biological Diversity (CBD). Thus began a slow and weak diplomatic process that has seen more frustration than success on the level of global politics. What the Earth Summit did achieve was a focusing of international attention on the imperative for conservation in general and in particular (O'Toole 2011: 14). What it did not achieve was a reevaluation of a hegemonic economic model that called for ever-expanding levels of production and consumption in order to be considered successful. The CBD reframed the issue of environmental degradation, as opposed to actually addressing the "contributions to existing environmental crises of existing international political structures, development models, or present international and national distribution of resources (McAfee 1999: 13)." Regardless, it was no longer acceptable in certain circles for nature to be viewed as an aggressor to be tamed (Gudynas 2010: 276) or as "idle unproductive areas of no value (Rodríguez 2011: 365)." Nature could and should be viewed as fragile and natural resources as finite (Gudynas 2010: 276).

With this acknowledgement of the present-day environmental crisis came a "growing consensus that conservation requires local participation (Kaimowitz et al. 2001: 279)." Decentralization in Nicaragua began with 1988's Law No. 40: *Law of Municipalities* (Ortega Saavedra 1988), granting local governments the responsibility "to develop, conserve and control the rational use of the environment and natural resources as the basis for sustainable development (Larson 2004: 57)." Hence the 1990s witnessed that "*the municipalities of Nicaragua are interested in the forests* (Kaimowitz 2001: 52)," as local governments began to promote reforestation, agroforestry, and broad-scale watershed protection initiatives (Larson 2004: 64). Though the central government has been slow to allow a full transfer of control, conservation has nevertheless become a political objective in Nicaragua for the first time since Zelaya's 1905 law. This is in large part due to pressure

exercised by an influx of international NGOs and their funding priorities; but it has also been effected in certain cases "from below (Larson 2004)," that is to say from communities demanding that the government take action on certain environmental concerns.

1996 witnessed the passing of Law No. 217: *General Law Concerning the Environment and Natural Resources* with the stated objective to "*establish norms for the conservation, protection, improvement and restoration of the environment and natural resources, ensuring their rational and sustainable use* (Chamorro 1996: 1)." This law was followed by 2003's Law No. 462: *Law Concerning Conservation, Promotion, and Sustainable Development of the Forest Sector* (Bolaños Geyer 2003: 1), then by 2006's Law No. 585: *Law Concerning the Ban against the Cutting, Use and Commercialization of Forest Resources* (Bolaños Geyer 2006: 1). Laws alone will not reforest a landscape, but as the formal structures for conservation are put in place, the capacity for local authorities to make demands increases, which adds legitimacy to decentralization in general and to local constituencies in particular (Larson & Ribot 2004: 10).

1997 saw the notion of sustainable development infiltrating deeper into the economic sphere with the Kyoto Protocol's allowance of the carbon trade between nations (Alavalapati & Nair 2001: 76). Though the Kyoto Protocol failed in its objective to produce a binding international agreement on climate change mitigation (O'Toole 2011: 14-15), it did spur on certain national governments and international organizations to formulate policies dealing with forest carbon sequestration and payment for ecosystem services (PES) (Alavalapati & Nair 2001: 76). 1997 also saw the publication of Gretchen Daily's *Nature's Services: Societal Dependence on Natural Ecosystems*, which sparked increasing interest, research, and incentivization of PES schemes (Rapidel et al. 2011: 2). 2003 saw implementation of the GEF-Silvopastoral project for management of ecosystems in the Central Highlands of Nicaragua, administered by the NGOs Nitlapán of Nicaragua, CATIE of Costa Rica, and

CIPAV of Colombia (Casasola et al. 2007: 80, Marín et al. 2007: 110), ushering in the next chapter in the land-use history of rural Nicaragua.

15. “Si un organismo me regala semillas, las sembro” (Don V. de Muy Muy, 7/10/2011)

Some of the nongovernmental organizations involved in Nicaraguan agricultural development since 1992’s Earth summit have included such international groups as CATIE of Costa Rica, GIZ (GTZ) of Germany, CIPAV of Colombia, and ODESAR of Spain, as well as domestic organizations such as Nitlapán, INTA, NicaCentro, and FondeAgro, among others. Though initially fragmented in terms of approaches and priorities (Spalding 2012: 223), within the past decade, much of the work of these organizations has been based on an ecosystem-centered approach to agricultural development (Gudynas 2010: 274). In Nicaragua, PES schemes have comprised a large portion of the agricultural extensionist work of the past decade for a number of reasons. Ecosystem services are defined as “the conditions and processes through which natural ecosystems, and the species that make them up [cattle included], sustain and fulfill human life (Daily 1997: 3).” One common misconception regarding ecosystem services is that they are provided solely by trees or forests (Rapidel et al. 2011: 4), when in fact scientific evidence suggests and local ecological knowledge has been well aware that “well-managed farm fields and grazing lands can actually produce and even restore ecosystem services (Scherr 2011: *xxi*).” Meanwhile, Central America in fact “surpasses all other regions globally in terms of having the greatest integration of trees within agricultural landscapes (Rapidel et al. 2011: 5).” This is a fact borne out of many generations of well-managed land-use that has incorporated agroforestry and silvopastoral systems since well before the Spanish Invasion. Squier (1860) and Belt (1888) both reported observing these agricultural technologies in the 19th century, and Ainsworth (2010) has corroborated in the present-day.

Regardless, though, uptake of PES schemes among rural Nicaraguan agricultural producers has been reportedly slow (cf. Kaimowitz & Angelsen 2008, Villanueva et al. 2011: 142, et al.). This has been credited to such factors as "high investment cost, lack of capital and lack of technical knowledge for establishing and managing these systems (Villanueva et al. 2011: 142)." Though these factors may play a role, they seemingly did not deter agricultural producers in past centuries from incorporating agroforestry and silvopastoral systems into their land-use regimes even without the added incentive of PES schemes. What is more, the third factor cited above betrays an additional potential factor in the slow uptake of PES schemes in rural Nicaragua: the dominant use of a managerial 'expert' discourse on the part of NGOs and extensionists when interacting with local communities that have been managing a particular landscape for generations if not centuries.

Centuries-old silvopastoral systems, i.e. the combination of forestry and grazing into one agricultural system, are being investigated and incentivized by present-day NGOs in Nicaragua. These systems incorporate technologies such as multistrata live fences, tree fodder, tree crops, and pasture rotation, among other bio-intensive practices such as shade-grown cacao production. It appears that these technologies had been disincentivized through the course of the 20th century; first by the disastrous land-management policies of the Somoza era, then by the continued emphasis on agrochemical use of the Sandinistas' 'Green Revolution.' Having fallen out of ubiquitous usage in favor of industrial-grade alternatives, these local technologies did indeed call for reinvigoration among rural agricultural producers, for their environmental, biophysical, and economic benefits. Other new technologies which have been introduced by agricultural extensionists in the past decade have included fodder storage by means of a silo; new grass species which are not grazed, but cut by hand or machine (*picadora*) and fed to cattle in a covered outbuilding, or *galera*; relatively sterile buildings or spaces devoted exclusively to milking and the handling of milk (*salas de ordeño*); mechanized milking machines

(*ordeñadores*) on certain capital-intensive farms; new varieties of livestock, such as the buffalo and the *peligüey* sheep; electrical fences; and the 'rational' use of agrochemicals for weed suppression in lieu of fire.

This last introduced technology, use of agrochemicals for weed suppression, presents a conflict of interests, particularly when viewed from a historical perspective. Though used as a land-management strategy in western Nicaragua for many millennia, there are considerations in the present day that purportedly make it less than ideal in terms of the health of tree species and biodiversity in general (Aguilar & Nieuwenhuyse 2009: 44). At the same time, there are alternate considerations in other parts of the world that have credited the use of fire as a land-management strategy in improving "local landscape heterogeneity as well as species diversity (Balée 2006: 77)," and in preventing more destructive wildfires through fuel reduction (cf. Cronon 1983: 50-51, Balée 1998: 19, Balée 2006: 77). In either case, to have villainized this particular land-management strategy to the point that it is perceived by extensionists and local administrators in western Nicaragua as universally inappropriate seems to be an errant message. That the use of agrochemicals is so widespread and pervasive throughout the countryside of Central America is due to a number of socio-historical factors, among which the villainization of fire is dominant. The negative consequences of the widespread use of agrochemicals are well known, both locally and in the academic literature (cf. Faber 1993, Daily 1997, Levard & Marín 2000, et al.). What is more, there is still a lack of valuation for organic agricultural practices in general, such as the use of cow manure and chicken litter as fertilizer instead of agrochemicals. It is alarming that the technical literature disseminated to Nicaraguan agricultural producers so often promotes the continued use of agrochemicals, albeit in a 'rational' manner.

This technical literature is often pervaded by a managerial discourse that does not appear to value local knowledge, its flexible nature, nor its ability to incorporate and integrate 'scientific' recommendations into an already

functioning ‘local’ technology regime. One particular agricultural extensionist who worked in Muy Muy told me that local knowledge simply did not exist when his organization arrived in the 1990s. This disconnect between scientific and local in the realm of technology transfer has been recognized by a number of authors (cf. Agrawal 1995, Levard & Marín 2000, Castillo Piniero & Aguilar-Støen 2009: 36, et al.). Regarding fire as a land-management strategy, its use has been nearly entirely eliminated in Nicaragua as a result of foreign intervention and regulations imposed by MAGFOR (the Nicaraguan Ministry of Farm Animals and Forests) and MARENA (the Nicaraguan Ministry of the Environment and Natural Resources), and supported by local municipalities. These regulations came as a reaction to rampant forest fires that followed an El-Niño-driven drought in 1998, and spread throughout much of Central America (Larson 2004: 63), the product of an admittedly unwise use of fire as a land-management strategy.

The controlled use of fire as a land-management strategy has been studied, though, in the Petén region of neighboring Guatemala (Colón et al. 2009: 31-34). This study documents preliminary measures taken by farmers to reduce the extent of a controlled fire and to avoid areas or features from unintended damage (Colón et al. 2009: 31), a practice also noted by Lopez et al. in Belén, Nicaragua (2004: 86). The Petén study also details some of the advantages of the use of fire, such as eradication of undesired weeds, reduction of excessive fuel and plagues, the encouragement of new growth in certain grass species, including *jaragua*, and the stimulation of dormant seeds of *brizantha* grass (Colón et al. 2009: 31-32). Those interviewed for this study indicated an advanced knowledge of best times of year and of day for the optimal use of fire, and they opined that the real issue at stake is not fire itself, but control of fire as a land-management strategy (Colón et al. 2009: 33-34).

16. El Neo-Sandinismo

But, of course, the story does not end there, and the present-day deserves attention within an historical context just as much as any other era. As described above, the last decade has seen drastic changes in terms of land-use strategies, incentivized by capacitation workshops held by international NGOs and PES schemes. It has also seen a return to political power of Daniel Ortega and his Sandinista party, with implications for how international NGOs may continue to function in the Nicaraguan countryside going forward. Though Ortega never fully retreated from national Nicaraguan politics, he reemerged into full public light in 1999 with a political pact struck between himself and then-incumbent President Arnoldo Alemán (Close & Martí i Puig 2012: 10), in a strongman political maneuver reminiscent of the Somoza era. This pact included constitutional reforms aimed at "strengthen[ing] the executive at the expense of other parts of government, reducing presidential accountability, [and] turning nonpartisan administrative agencies into party strongholds (Close & Martí i Puig 2012: 10)." In Ortega's presidential campaign of 2001, he verbally committed his party to "follow the same economic policies that conservative administrations had followed since 1990 (Martí i Puig & Close 2012: 289)." By the time of his reelection in 2006, Ortega's Sandinista party was no longer centered around trying to end poverty and exclusion in a country marked by gross inequality in its distribution of wealth and resources (Martí i Puig & Close 2012: 288). Rather, by "adhering to the strictures required to qualify for loans from the International Monetary Fund (Close & Martí i Puig 2012: 15)," the Neo-Sandinista administration has sought to procure for the less-privileged sectors some measure of state-subsidized benefits, through programs such as *Hambre Cero* for example, without directly challenging the position of the country's established elite class (Spalding 2012: 236).

The continued emphasis on poverty-reduction efforts in the Nicaraguan countryside throughout the 1990s had largely been carried out not by the

national government, but by international NGOs, some of which (CATIE for example) had been funded predominantly by USAID (United States Agency for International Development). Once USAID had withdrawn 100% of its funding from CATIE by the close of the century, CATIE was forced to procure additional funds from donor organizations of various northern European governments. Since that time, both Sweden and Denmark have withdrawn their funding, and more countries may follow (CATIE professional #2, Turrialba, 29/11/2011). At the same time, there has occurred a general effort by the Ortega administration to silence critical voices from civil society organizations, which are "depicted as being composed of rightist organizations working against the government (Martí i Puig & Close 2012: 295)." Concerns were publicly voiced in 2008 by Swedish ambassador to Nicaragua Eva Zetterberg concerning "authoritarian signals" from Ortega's administration, presaging a 2009 Supreme Court decision that declared that constitutional prohibitions on presidential terms-of-office would not apply to the Sandinista leader (Martí i Puig & Close 2012: 293-297). Exerting an overwhelming control over Nicaragua's electoral process, Ortega won his second consecutive and third lifetime presidential term in 2011 (both conditions were previously banned under the 1987 National Constitution that Ortega himself helped to pass).

At the same time, a new relationship between the governments of Nicaragua and Venezuela has emerged since Nicaragua's joining of the Bolivarian Alliance for the Americas (ALBA) in 2007. This has translated into over US$3 billion dollars of commerce between the two countries in the past six years (Loáisiga López & Guerrero 2013). Much of the commerce flowing out of Nicaragua has been in the form of foodstuffs, including meat, milk, and live cows (Loáisiga López & Guerrero 2013). Producers in Belén commented that those live cows that previously went to market in Mexico are now generally exported to Venezuela. In terms of the import of Nicaraguan goods, Venezuela is now second only to the United States (Loáisiga López &

Guerrero 2013). In return, Nicaragua has received sources of energy: nearly 12 million barrels of petroleum in 2012 alone, as well as the installation of 11 electrical plants.

This ultimately means that the future of relations between the Nicaraguan government, civil society organizations, international NGOs, and the agricultural communities in between is still to be determined. Venezuela's burgeoning relationship with Ortega's strong-handed neo-Sandinista administration is likely to play an increasingly important role, but that may depend on the aftermath of Venezuelan President Hugo Chávez' recent death in March 2013. As always, the future remains uncertain.

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Summary of Part III: Intervention

The Somoza dynasty in Nicaragua took power following the withdrawal of U.S. Marine forces in 1933. With little to no regard given to improving the standard of living for the majority of the Nicaraguan populace, the Somozas went about consolidating land and wealth into the own family coffers, utilizing their own massive political influence and the military force of the *Guardia Nacional*. The Somozas also sought to modernize the agroexport sector in Nicaragua, with vast ecological consequences as agrochemical cotton and sugar monoculture plantations replaced forests, farms, and fields throughout western Nicaragua. This modernization of the agroexport sector entailed dramatic changes to cattle ranching as well. 1957 witnessed the opening of Central America's largest slaughterhouse, the *Matadero Modelo*, located in Managua. Along with improved transportation infrastructure, this meant a much greater flow of meat out of the country than was previously possible by traditional means. It also meant that the amount of land in Nicaragua under pasture more than doubled, as herd sizes increased and were supplemented by newly introduced breeds, such as the American Brahman and the Santa Gertrudis. Agrochemical use in the Nicaraguan countryside increased in a

tremendous fashion as well, at the immediate expense of the nation's environment.

The Somozas' unapologetic exploitation of resources at the expense of human and biotic communities represented an entirely unsustainable mode of national development, and elicited armed insurrection toward its overthrow by the Sandinista Front of National Liberation. The Somoza dictatorship was finally toppled in 1979, and though the post-revolutionary FSLN government strove to address issues of wealth inequality and redistribution of resources, it did not fully address issues of environmental degradation as a result of the previous three decades of rampant industrialization. On the contrary, it spread the technologies of the so-called 'Green Revolution' to all strata of Nicaraguan society. This in effect made agrochemical use both common and widespread throughout the Nicaraguan countryside, and separated individuals if not communities from their local ecological knowledge systems. At the same time, Cuban agricultural extensionists introduced new practices and new cattle breeds (Holstein and Pardo Suiza) to incentivize dairy production in the Central Highlands, an effort that met with much success in establishing the *ruta de la leche* between Matagalpa and Matiguás.

The Sandinista's agricultural and social reforms, though, were put on hold by an increasingly costly and violent civil war, supported by the Reagan administration of the United States. This conflict was particularly destructive to the Nicaraguan agricultural sector, as the countryside became immensely violence-prone and counterrevolutionary forces specifically targeted agricultural and collective infrastructure. The Sandinistas were ultimately voted out of power in 1990 after years of a trade embargo by the U.S. that crippled their economy and induced an unnecessary amount of suffering.

The 1990s saw a transition to neo-liberal economic measures in keeping with the demands of international sources of funding, i.e. USAID and the Inter-American Development Bank. The agricultural sector regrew as individuals and communities returned to the abandoned pastures of the

countryside. At the same time, state involvement in the agricultural sector shrank, creating a vacuum that would be filled by dozens of international NGOs. Though at first slow to formulate a unified scope of purpose, many of these international NGOs have in the past decade been dedicated to the incentivization of silvopastoral systems, amongst other measures to promote the valuation of ecological services. This scope of purpose is in keeping with the conceptualization of 'sustainable development' as set out by 1992's Earth Summit in Río de Janeiro.

Daniel Ortega and his Neo-Sandinista party made a return to the forefront of Nicaraguan politics in 2006 with still uncertain ramifications for the future role of international NGOs in the Nicaraguan countryside. The so-called "second generation" of PES schemes (such as UN-REDD) have taken footing in neighboring Costa Rica (Rodríguez 2011: 372), and are primed for implementation by NGOs in Nicaragua as well. Ortega's recent strongman political maneuverings, though, cast doubt on the continued process of decentralization that allowed international NGOs to gain a foothold in the countryside in the first place.

Part IV: Innovation

2003 satellite image of the Republic of Nicaragua as seen from space, courtesy of the U.S. National Aeronautics and Space Administration (NASA)

17. “Tenemos todo tipo de pasto” (Don V. de Muy Muy, 7/10/2011)

The following section will describe the present-day land-use mosaic among small and medium-scale agricultural producers in the two locations of fieldwork for this paper: Muy Muy in the Central Highlands and Belén on the Rivas Isthmus. An historical synopsis of each will be tied into the modern patterns of daily life. This will be followed by a comparative section and a short discussion of prospects for the future.

Muy Muy is located in the Central Highlands of Matagalpa Department at an altitude of 337 meters above sea level. Its land is characterized as dry tropical forest, with temperatures ranging between 24 and 26°C and a rainy season lasting approximately seven months from May to November (AMUNIC/INIFOM 1997b: 3-4). It was the center of a politically well-organized indigenous community until well into the 20th century. Though its bottomlands may have been utilized for transhumance of livestock in the colonial era, it was not until the coffee boom of the second half of the 19th century that settlers of European descent (Spanish, German, North American, and mestizo) moved into the area in earnest, pushing the boundaries of what was then considered the agricultural frontier. Hacienda La Estrella in Muy Muy represents one remaining example of an estate from the era of the coffee barons. An additional influx of mestizo settlers moved into the area coinciding with Somoza’s forced relocation of populations from the León/Chinandega plains to make room for cotton cultivation in the 1950s. The area around Muy Muy was heavily logged for valuable timber species during the Somoza era as well, which brought both an increase in roads and a decrease in native woodlands and the animals that inhabit them. One interviewee remarked that “*the future generation is not going to know those woodland animals*.”

The Civil War of the 1980s was particularly impactful in Muy Muy, as its location near active conflict zones meant that many men and women were

recruited into opposing sides of the conflict. This continues to influence the politics of the municipality. The war ultimately resulted in a doubling, then tripling, of the urban zone of Muy Muy, as many people were forced out of the countryside for fear of damage to loss and property.

Since the Sandinista Revolution, Muy Muy has been the recipient of more than three decades of international agricultural intervention, beginning with the Héroes y Mártires de Pán Casán project, led by Cuban extensionists in the early 1980s, establishing what came to be known as the *ruta de la leche*. Opinion in town regarding the Sandinista government in general is quite mixed, as many lost a considerable amount of hereditary land as a result of the confiscations, whereas others now possess all the land their families have ever owned as a result of the confiscations. What can be stated definitively is that the confiscations here produced a broad demographic mix of landowners: large, small, and medium; high-income and low-income; materially endowed and subsistence level. Most recently, the Costa Rican organization CATIE, amongst other international NGOs, has been intimately involved in the re-incentivization of silvopastoral systems by way of technical workshops and introduced fodder species. CATIE seems also to have fomented the establishment of a vocational school for agronomy and livestock farming, as well as the increased use of agrochemicals.

This international agricultural involvement has led to a local awareness of climate change and ecological services that is thoroughly scientific in terms of the vernacular employed, as opposed to contextual. Common in my interviews was the theme of deforestation as the cause of increased frequency of droughts, less rainfall, and the drying up of sources of groundwater. Older technologies such as silvopastoral systems, fodder trees, and live fences are utilized in tandem with newer introduced technologies, such as paved roads, pasture rotation, drought-resistant African grasses, and *pasto de corte*. These technologies are utilized by all agricultural producers in Muy Muy, large and small, whether they were involved in the initial technological assistance

projects or not. This has been achieved through a farmer-to-farmer exchange network of barters and trades. Mixed-use pastures of introduced grasses interspersed with leguminous fodder trees and shrubs are not an uncommon sight; as well as pasture grasses interspersed with food crops, such as maize; or fenced-off parcels of various types of *pasto de corte*.

One grass species, jaragua (*Hyparrhenia rufa*), which was introduced over 100 years ago and was once quite significant within the extensive cattle ranching system of pre-Sandinista days, appears at present to be disappearing from the pastures of Muy Muy. At the same time, fire as a land-management strategy is also disappearing from the pastures of Muy Muy, likely a related phenomenon as jaragua is a drought-resistant grass that benefits from seasonal burning (FAO 2013). The common prevailing opinion amongst producers in Muy Muy is that burning of fields is environmentally destructive, and so it is generally not practiced, and it would be frowned upon if someone were to break this mold.

One of the most striking examples of the presence of rationalist science in the local discourse is the highly advanced knowledge of cattle breeds, the nutritional quality of their milk, and the effect of particular fodder types on that quality, to the point that some ranchers could from memory tell me the exact protein content of this leaf or that blade of grass. This is due in part to the involvement of international organizations, but also to the founding of the aforementioned technical agronomy school in Muy Muy, devoted to the scientific management of farm animals. It is also in large part due to the founding about five years ago by the Nicaraguan NGO Nitlapán of a business (ACOPIO) that supplies milk to the Parmalat factory in Managua. Local ranchers now have the availability to sell their milk daily to this store at fixed rates dependent on the nutritional quality of the product. With a 90-córdoba, or almost $4, difference in pay between the highest category of milk and the lowest, it is in the ranchers' interest to ensure the quality of her/his cows' milk through selective breeding and high-protein forage; hence such a nuanced

knowledge of the exact protein content of specific fodder types. One interviewee put it that the grasses used to be stronger, but now it is the milk that is stronger. Another interviewee was quoted as stating simply that "*here the money is the milk*."

Though cattle-ranching is the principal economic activity of Muy Muy, still a diversified land-use mosaic is present among small- and medium-scale producers, incorporating cattle, chicken, pigs, horses, pasture, basic grains, a fish pond, fruit trees, precious wood trees, and often a small patch of forest (*montaña*). Aspects of this mosaic, though, have changed over time, most recently with the introduction of new exotic grasses and new livestock such as the buffalo and the peligüey, a tropically adapted race of sheep. Milk has certainly attained the status of economic hegemony in the area, owing to the planned creation of the *ruta de la leche*. A distinct break from the local land-use system is an almost complete replacement of fire by agrochemicals for purposes of weed suppression and crop fertilization. Of dozens of ranchers interviewed, only one did not use agrochemicals on his farm. Another stated that he required twice as much agrochemicals for a good harvest as did his father's generation. Some farmers even reported that their crops are no longer able to produce at all without chemical assistance. At the same time, many of those interviewed were fully aware that this dependence on foreign-produced chemicals was affecting their own local ecosystem and health. One interviewee stated "*there is no good development with chemicals*." Nevertheless, agrochemical use is common and widespread on the motive that it is cheaper than *mano de obra*, more convenient, or on the basis that it is simply the *modus operandi*. Several interviewees expressed that they learned how to use chemical fertilizers from workshops given by CATIE.

…

Belén is located on the Rivas isthmus of the Pacific Coast of Nicaragua, 12 kilometers north of the city of Rivas. It lies at an altitude of 80 meters above sea level in a geological formation known as the lacustrine depression

(AMUNIC/INIFOM 1997a: 4). Its land is characterized as dry tropical forest interspersed with tropical savannah with a temperature range between 26 and 27°C (AMUNIC/INIFOM 1997a: 4). Belén is relatively much flatter than Muy Muy, with a narrow plain extending east of the Pan-American Highway toward Lake Cocibolca (Lake Nicaragua) and rolling hills extending westward to the Pacific coastline. These hills are transected by the rivers Gil Gonzalez and Las Lajas further to the south, which both empty into Lake Cocibolca and which are both of immense importance to the subsistence of local communities, but which also present barriers and dangers in times of flood. Belén lies in the shadow of the Concepción volcano on the island of Ometepe, which has endowed the Rivas isthmus with particularly fertile soil owing to the volcanic ash deposited over millennia. The volcano has also in historic times destroyed crops and disrupted entire seasons with its volcanic activity. Belén is also subject to environmental disruptions caused by the El Niño/La Niña ocean oscillations, such as floods and droughts. Droughts are anticipated to become increasingly more severe in the future in Belén, owing to the effects of global warming (Sánchez et al. 2013: 17).

Situated between the seat of the pre-conquest Nicarao government in Pica Pica and a pre-conquest population density in Rivas, Belén before the Spanish invasion was likely a thriving agricultural landscape with extensive groves of cacao trees (*Theobroma cacao*), the seeds of which constituted the ostensible source of the Nicaraos' wealth. Belén's indigenous population and that of surrounding areas was among the first in Nicaragua to be decimated by the early conquistadors' trade in slaves. This left the landscape open to colonization first by cattle, which were left to reproduce and graze free-range across the anthropogenic savannahs of the Pacific Coast. This gave way to colonization by the Spanish diaspora out of Granada of the 17th century, at which point El Obraje (later renamed Belén) was founded as an indigo plantation. The mid-18th century brought interaction with North American wealth, customs, and standards of living via Cornelius Vanderbilt's Accessory

Transit Company, which ferried passengers across the isthmus of Rivas on the way to the gold rush of California. The introduction of the banana family (*Musacea* spp.) followed shortly thereafter, which would by the 20th century have drastic effects on local agricultural output.

The Dolore sugar factory in nearby Potosí was founded by Anastasio Somoza García in 1940, followed the next year by construction of the Pan-American Highway. The production of white centrifugal sugar was amped up here following the Cuban revolution of 1959, and the U.S.' boycott thereafter of Cuban sugarcane. Nationalized by the Sandinistas in the 1980s, then privatized anew in the 1990s, this sugar factory, now known as the Benjamín Zeladon factory, is still the primary source of formal employment in the area. The land reforms of the Sandinistas in the 1980s do not appear to have had as profound and long-lasting an effect on local land tenancy in Belén as in Muy Muy. Similarly, though international NGOs have been active in this area in recent decades, their effect on local land-use has not been as profound as that seen in Muy Muy.

Historically a center of wealth in Nicaragua, both in the pre-conquest era and as a satellite of Granada in colonial times, this means a higher material standard of living than Muy Muy in terms of construction materials and means of transport. Tiled rooves for instance are a luxury item in Muy Muy, but quite standard in Belén. Motorcycles are more abundant in Belén, as well as privately owned bus services. The primary cash crops are no longer cacao or indigo, but papaya and sugar cane for the large-scale landowners, and bananas and plantains for the small-scale farmers.

Cattle are also quite present within the landscape, but not as ubiquitous as in Muy Muy. There is little to no scientific delineation of breed types here. Cows are generally criollos, and you will find neither Brahman nor buffalo in Belén. Protein content of individual forage sources is not common knowledge here either, though producers are quite aware of which fodder trees at what times of year are best for or most preferred by their cattle (Joya et al. 2004: 46-

47). Milk is consumed domestically or made available for local sale, and most old cows go to the slaughterhouse in Nandaime. Rotation of pastures is present, but extensive cattle ranching with naturally occurring grass is still the dominant grazing practice. There are few *picadoras* here (I encountered only one, the oldest I'd seen in Nicaragua, which is rented out to the community at large), no *galeras*, two or three silos, and not much in the way of the so-called 'improved' grasses. One interviewee stated unequivocally that "*improved grasses fail here*," though one grass species introduced in the 19th century as an 'improved grass' greatly enhanced the size and nutrition of Belén's cattle herds over 100 years ago: jaragua.

Unlike in Muy Muy, jaragua is still relatively common in Belén, where it was cited as "*the best that is grown here*." The use of fire for weed control was also relatively common, until the Nicaraguan environmental agency, MARENA, introduced a series of regulations penalizing its use following human-induced forest fires in 1998. Still one hears such sentiments from producers in Belén as "*pastures need a fire*" and "*how nice it is to use fire*." This is in stark contrast to the sentiments that one generally hears in Muy Muy or in the halls of CATIE. Climate certainly has a role to play in this distinction. Belén receives less annual precipitation than Muy Muy and has a longer dry season, lending itself to millennia of seasonal burning that has produced the biotic communities and savannahs that are now considered an ecological landmark of the area. Also at play is the distinct relationship between local producers in Belén and the international NGOs working in agricultural development in the area.

CANTERA, a non-for-profit organization founded by the Sandinista government in the 1980s to foster livelihood assistance, has been present here for almost 30 years, but the focus of their work has been not so much on agricultural intervention as on capacity building of marginalized groups. They have, though, introduced African bees for the production of honey. GIZ of Germany has incentivized reforestation efforts through the dissemination of

fruit-tree and precious-wood-tree saplings. Paid ten *centavos* per sapling planted, some producers have transplanted these trees into extremely tight rows to maximize their own pay-off per amount of land utilized; while most of the saplings have almost no chance of reaching maturity. The words of one producer in Belén, "*gifts don't work*," again stands in stark contrast to sentiments encountered in Muy Muy such as "*If an organization gifts me seeds, I plant them*."

CATIE, as of the time of writing, has concluded their investigation phase of work in Belén, but has not yet continued with implementation or dissemination of fodder tress. Due to the present lack of implementation, producers in Belén do not generally consider that they are working with CATIE, so much as they are allowing their presence. Funds for implementation of CATIE's project are still forthcoming, and in the words of one CATIE professional, "*It's complicated* (#3, Belén, 28/11/2011)."

The largest source of formal employment in the area is the Benjamín Zeladón sugar factory in Potosí, as it has been for many decades, though the newest source of income from this factory is its system of payment for ecosystem services (PES). In the hilly terrain west of the Pan-American Highway, where small- and medium-scale landowners engage in a mixed mosaic of land use, there is a general consensus of there having been more woods and wild animals in the past than today. Aerial photographs taken between 1946 and 1997 do confirm this to an extent, but also indicate the continued presence of trees in 1997, particularly on the hilltops and in the direct vicinity of waterways. The sugar factory in Potosí is dependent on continued access to the water of the Río Gil Gonzalez, and has therefore begun to retroactively pay those farmers who live along the watershed of this river and who have maintained forested areas on their own lands. Those farmers who have maintained forested areas on their lands have done so out of a functional and aesthetic appreciation for the environmental, economic, and landscape services that the woods provide. They are aware of the utility of

forested riparian areas to dampen the deleterious effects of flash-floods, and they have maintained these woodlands for the most part without external incentivization, in fact despite of it in the case of the Sandinista extensionist efforts of the 1980s that attempted to convert riparian areas to agricultural use. An economic incentive has now been added in relation to conserving forested riparian areas, though issues with actual payment are still being resolved and valuations of woodlands' economic worth will not be determined by rural producers themselves, but from outside sources.

The privatization of conservation efforts, such as PES schemes, also poses ethical dilemmas with the risk that well-financed elite organizations might again be able to dictate land use to non-elite peasantry as in the age of caudillismo and Somocismo. In this scenario, elite entities continue to receive a lion's share of natural resources, now at a greater premium determined by international market values; but without addressing the fundamental problems of inequity that have spurred environmental degradation and loss of local technologies (McAfee 1999: 2). In the case of Belén, forested riparian areas approaching the headwaters of the Río Gil Gonzalez may now be internationally valued and this may in the short term benefit those producers who have maintained them. But at the same time, by way of the new PES scheme largely funded by CASUR (the private company that currently owns the sugar factory of Potosí), attention has been deflected from the historical chemical pollution of Lake Cocibolca and the surrounding communities who have experienced pronounced illness as a result of aerial agrochemical spraying. CASUR stands to continue to receive water, as opposed to blame. The more things change, the more things stay the same.

…

Will wage-earners continue to subject themselves to the unhealthful conditions found in agroindustrial settings, such as the sugar factory of Potosí? Due to a shrinking demand for labor and the low rate of pay, wage work has ceased to be an integral part of the local economy in rural Nicaragua

(Baumeister 2012: 259). Many Nicaraguans, though, are working abroad in Costa Rica or the United States, where salaries are considerably higher; hence remittances account for a good proportion of family income in Belén and Muy Muy. Almost a third of Nicaragua's GDP is comprised of remittances sent by the 12.5% of Nicaraguans who work abroad (Morris 2010: 194). In fact, almost every farmer interviewed in Belén had at least one child living and working either in Costa Rica or the United States. Many sons and daughters had also relocated to Managua for income. Immigration has also become a factor around Belén, as ranchers from Europe and North America have begun to buy land, and tourist infrastructure is now visible on the road through San Marcos, connecting the Pan-American Highway with the Pacific Coast.

In general, the agriculture practiced by small and medium-scale producers in Belén has not yet incorporated the same kinds of introduced technologies as that of Muy Muy; while the large-scale producers of Belén use technologies as thoroughly industrial as spraying chemicals by means of airplanes. This discrepancy in resources has in part been equalized in Muy Muy, where the Agrarian Reform of 1979 was soon thereafter followed by the agricultural interventions of the Héroes y Mártires de Pan Casan project, producing a mix of large and small landowners, all with access to agroindustrial innovations. With a higher baseline standard of living and a comparatively lesser amount of international intervention over the decades, the Agrarian Reform of 1979 seems to have had less impact on the distribution of resources in Belén.

Silvopastoral systems are present in Belén in their own right, and have been for many centuries, though they are not so ubiquitously referenced in daily discourse as they are in Muy Muy. Some 'improved' grasses are present in Belén, though not nearly to the extent one witnesses from the roadsides of Muy Muy. *Mano de obra* (manual labor) remains the least expensive and most commonly utilized form of pasture and crop management in Belén, as opposed to agrochemical herbicide or fire. In fact, one study from 2003 found that 10 of

15 producers in Belén never use chemical herbicides for the known damage it causes to soil microorganisms and the natural regeneration of desired tree species (Lopez et al. 2004: 81). This, again, is in stark contrast to the state of affairs one finds in Muy Muy. It yet remains to be seen what changes might be brought by an agronomy school, similar to that of Muy Muy, proposed to be established on the road to Mata de Caña in Belén.

18. Conclusion: “La tierra está cansada” (Don N. de Muy Muy, 20/10/2011)

> *Causes of pasture degradation are varied and occur at a number of scales including national (e.g. laws, regulations, incentives) and local (e.g. access, infrastructure, security) factors that affect producers’ ability to invest in more intensive or environmentally friendly management practices.* (Szott et al. 2000: *ix*)

To say that tropical deforestation is caused directly and inextricably by cattle ranching, as claimed by Myers in his short treatise “The Hamburger Connection,” is a gross inaccuracy. The most obvious and immediate counter to this claim would be to point out, as I have done, that anthropogenic savannahs did occur in western Nicaragua at the time of the Spanish invasion, a result of many generations, if not millennia, of seasonal controlled burning by indigenous peoples. This statement represents an essential contribution of this work itself. When the conquistadors set out to mark enormous tracts of land as their own by way of grazing cattle on those lands, they were attempting to domesticate a landscape that had already been domesticated. The conquistadors failed to acknowledge this, since their own set of values, mores, and priorities were so radically divergent from that of native Nicaraguans.

The historical hegemony of the elite class in Nicaragua, and in Latin America on a whole, since the time of the Spanish invasion has continually influenced and effected changes in the landscape and developments within the national economy and on its principle products, many of which are derived from cattle ranching. This elite class initially consisted of the conquistadors, who were granted authority over enormous tracts of land by the Spanish crown; who gave only nominal consideration for the indigenous populations that were being killed, displaced, or dying of disease; and who transplanted the Iberian tradition of livestock transhumance to the anthropogenic savannahs of

Central America. After the period of conquest, the elite class evolved into the Spanish-born *peninsulares*, as they were known, who invested their earnings from overseas commerce into land and cattle, in the process seizing the communally owned forested lands of the native populations and converting them to pasture. By the mid-19th century, the elite had evolved into a group of oligarchic, politically connected families who acquired their large estates, or haciendas, for the most part through inheritance or intimidation. The mestizo peasants who worked their land had either long since been ensnared into a cycle of debt, or else opted for low-wage hacienda or plantation work in lieu of eking out their subsistence in the less productive highlands to which their communities had been forced.

It was not until the introduction of the capitalist agroexport model under Zelaya that the full effects of industrial deforestation began to take effect. This model was expanded and abused under the Somoza dictatorship, resulting in a laboratory of natural resource exploitation with no regard whatsoever for long-term sustainability. The Somozas' technocratic regime ran over the rights of the peasantry at will, invoking the traditional relationship of *patrón*/*peón* as justification. The pace of deforestation under the Somozas reached new heights, evidenced by first-hand accounts of those who lived through the regime and by aerial photographs taken by the U.S.A. and the U.S.S.R. between 1946 and the present day (and housed in the *Archivo Técnico* of INETER in Managua). Granted, a good portion of this deforestation was directly associated with the expansion of cattle ranching, but for purposes of expanding the agroexport industry which the Somozas had a personal interest in promoting as the owning family of Central America's then-largest slaughterhouse, the *Matadero Modelo*, in Managua.

The rampant increase in deforestation in Nicaragua in the latter half of the 20th century had very little to do with the small to medium-sized producer practicing a diversified land-use system that incorporated cattle as well as other livestock and subsistence practices. Trees are and have been valued by

rural Nicaraguan producers for their practical uses, such as firewood, building material, fence-posts, pasture shade, cattle forage, and medicine, as well as for their ecosystem services, such as soil stabilization, nutrient dispersal, and water retention. In the end, it is the abuses of elite-controlled extensive cattle ranching, the ecological demands of industrial agroexport, and the social ravages of war and its aftermath that have been the true villains in this narrative. In the words of Larson and Ribot, "Natural resources are at once critical for local livelihoods… and are also the basis of significant wealth for governments and national elites. As such they have historically been a point of struggle between rural people and these elites (2004: 4)." The history of Nicaragua's class struggles, particularly in the 20th century, is a poignant manifestation of this sentiment.

Cattle ranching is and has been pervasive in Nicaragua, from the extensive tracts of the large-scale land-owners (quite a few of whom are now expatriots from abroad) to the family herds that provide milk and cheese to just a few individuals. It is not the keeping of herds *per se* that has caused such deforestation and land degradation in Nicaragua, but the relationship of landowner to land. On a whole, the large landowners of the elite class (the Somozas being the most egregious example) with a mind for profit-maximization have contributed the lion's share to deforestation: first with their usurpation of the communal forests of indigenous populations; then with the practice of sharecropping forested tracts to peasants on the condition that they clear the land for future agricultural use; then with the expansion of the 20th-century agroexport industry. At certain points in Nicaragua's history, such as the decades in the 17th century following the collapse of the Spanish shipping empire or the decades under U.S. Marine occupation when the policies of dollar diplomacy weakened the elite class, the peasantry was prosperous enough on a local scale to not need to rent from large landowners. At these points, the deforestation associated with sharecropping was curbed and local ecological knowledge benefitted the propitious family farm.

The national developments orchestrated by Nicaraguan elites have ranged from market trends to technological shifts, but not until 1979 did they include institutional changes in the relationship between *patrón* and *peón* in the agricultural sector. Up until this point, the agricultural practices of the Nicaraguan peasantry had been largely local, subsistence-level, and based on readily procurable resources, which required a nuanced understanding of local ecosystems. Once the U.S.-sanctioned Somoza dictatorship put individual profits in front of human lives for too long, a new regime of redistribution took power, but the Sandinistas continued to emphasize such nonsustainable practices as agrochemical use, deforestation, and overexploitation of resources. The reforms of the Sandinista Revolution did succeed in increasing the peasantry's access to land and infrastructure, but it also diffused many of the technologies that had previously been monopolized by large-scale landowners and had contributed to land degradation. Older agricultural practices, such as the use of fodder trees, did not die out altogether, but were in many instances combined with the practices of the 'Green Revolution.'

International nongovernmental organizations began to dominate the implementation of introduced land-use practices beginning in the 1990s up to the present day, but still largely within the paradigm of 'health through technology.' Not until the past decade have older practices such as living fences and silvopastoral systems been incentivized and reinvigorated by international organizations through workshops and programs such as 'Payment for Ecological Services.' Other introduced post-industrial land-use practices, such as agrochemical use, have become widespread and common throughout the countryside, and have led to the replacement of certain hardy heirloom crops, such as criollo maize, with higher-yielding varieties that are oftentimes dependent on agrochemical input.

In places such as Muy Muy, which has been the recipient of over thirty years of foreign technical assistance, cows are no longer simply cows: they are races with a specific quality of milk that pays more or less at the state-run milk

distributor. Grass is not simply grass: it is fodder with specific quantities of protein in each blade. Weather is not simply weather: climate change is a buzzword that can be heard at bus stations throughout the department. At the same time, pre-processed powders are now more commonly the ingredients of *refrescos* than is fruit. Molasses from sugar cane has been replaced by white centrifugal sugar. The centuries-old technology of using *cuajo* (a piece of cow intestine) in order to curdle milk and produce cheese has been almost entirely replaced by the use of a *pastillo*, a culture-in-a-pill.

In rural Nicaragua, though, many old technologies do still live alongside the new. The *manzana* as a unit of land could be referenced in the same sentence as the hectare without a second thought. The *vara* as a unit of measurement coexists without conflict with the meter and the American foot. Any herd of cattle in Muy Muy is likely to contain Brahman, Pardo, and Jersey cows, perhaps even buffalo, but Criollo above all, and any number of cross-breeds in between. In this way, it is evident that rural Nicaraguan agricultural producers are experimenting and innovating "by combining their existing knowledge with new information (Agrawal 1995: 426)." Some would argue that this could give rural Nicaraguan producers a distinct advantage over modern 'scientific' agronomists, since they have managed to incorporate a host of newly introduced technologies into a land-use system that has been adapted to local conditions over the course of generations (cf. González 2001: 100-101).

Unfortunately this is not the opinion published in the technical literature that is disseminated by NGOs to agricultural producers in Nicaragua. The re-incentivization of live fences throughout the Nicaraguan countryside represents one excellent example of a centuries-old local technology that has remained even more apt and useful within its local context than an introduced technology such as the electric fence. Despite this fact, still the technical literature describing this re-incentivization is often marked by a villainization of the small producers who are at once the stewards of the land-use practice

across multiple generations and the recipients of the present-day re-incentivization. Rarely in this technical literature is the finger of environmental degradation pointed at the large-scale agroexport industries that represent the principle cause of deforestation in Central America and globally.

…

Our bigger-and-better society is now like a hypochondriac,
so obsessed with its own economic health
as to have lost the capacity to remain healthy.

-Aldo Leopold, 1987: *ix*

As mentioned in Chapter 15, many Nicaraguan producers are fully aware that their dependence on foreign-produced chemicals affects their own local ecosystem and health. "La tierra está cansada" is in fact a commonly utilized phrase in rural Nicaragua. This is a theme whose regional implications in Honduras have been expounded upon by Susan C. Stonich in her 1993 *"I am Destroying the Land!": The Political Ecology of Poverty and Environmental Destruction in Honduras*. In this work, Stonich points at high population growth rates and a lack of economic alternatives forcing rural peasants to adopt destructive agricultural practices, such as the indiscriminate use of pesticides (3-4). The environmental degradation this causes only heightens the economic crisis in which rural peasants find themselves, as they become increasingly dependent on foreign-produced agrochemical inputs in order to produce the crops that fulfill basic and immediate needs (6-7). The chemical- and petroleum-based nature of post-industrial land use, influenced and informed by centuries of exploitative colonialism, has produced a situation in which livelihoods are threatened by the same measures by which they are purported to be secured.

More than just impacting human livelihoods, petroleum-based agrochemical technologies have been shown to reduce biodiversity and the genetic diversity of crop plants (Balée 2006: 82). A globalized system of

neoliberal free-market economics has at the same time produced a worldwide demand on agricultural commodities, such that more and more people are drawn into trade and market relations "which lie well beyond the boundaries of their local ecosystems (Cronon 1983: 14)." In the end, this translates into the jeopardizing of long-term sustainability in favor of short-term gain: a process that has been unfortunately occurring across the globe, wherever the capitalist agroexport model prevails. In the words of the progenitors of this analytical model, Blaikie and Brookfield, "under certain conditions of accumulation, capitalist land users seek to employ the resources of the biome for short-term gain, so that they are transformed into profit and not replaced (1987: 101)."

Ultimately it is neither the cows nor the cowboys that are the cause of widespread, rampant deforestation and land degradation in rural Nicaragua, but the industrial agroexport industry and its need to constantly increase production in order to compete within the global marketplace that spurred its growth in the first place. That is to say that present-day production and consumption standards and practices on a global scale directly affect the current state of the environment and its ability to provide the ecosystem services that are not adequately valued by present-day production and consumption standards themselves. These standards "respond exclusively [and hegemonically] to the political goals of economic growth, where sustainability remains high on the value scale, but is not reflected in public policy (Rodríguez 2011: 366)." These "political goals of economic growth" are intricately linked to a fossil-fuel-based economy and the disposability of manufactured goods that requires exponentially greater inputs in terms of material production and, consequently, consumption (Rodríguez 2011: 366). Even environmentalism has been lassoed into this paradigm in recent decades by way of carbon markets and PES schemes (McAfee 1999: 3). As a result of the 20th-century hegemony of this economic model, the Earth's store of fossil carbon, which has been built up over the past 3.5 billion years (Balée 1998: 15), has been more than halfway depleted in just over 100 years. Still,

alternative models of economic development are marginalized and often ridiculed by governments, media, and the public itself, particularly when it applies to systems of indigenous/local knowledge.

Thousands of years of indigenous domestication of the landscape, followed by centuries of non-intensive cattle ranching by small producers did not do nearly the kind of ecological damage that 60 years of industrial agroexport production has effected since the capitalist agroexport boom of the 1950s and afterwards. In fact, since 1950 the amount of land under pasture in Central America has more than tripled, in large part at the expense of old-growth forests (Van Ausdal 2009: 708). Social and civic damage (as opposed to ecological) has certainly been wrought in Nicaragua since the Spanish invasion, owing to the historical precedent of exploitation of natural resources by invading conquerors, foreign merchants, foreign investment, dictators, and errant government programs; though in none of these instances were subsistence producers the true deforesters, degraders, or 'villains' of the dialogue. Unfortunately the capitalist agroexport model, emphasizing continued production and consumption as paramount to economic health, prevails not just in Nicaragua, but on a global scale. Its hegemony is bolstered by the rationalistic absolutism of free-market neoliberal economics, which has been imposed on a number of low-income nations in Latin America since at least the Alliance for Progress of the 1960s to the fall of the Soviet Union in 1991 to the peak in world oil production in 2005 and beyond.

If one acknowledges the connection between the consumption-dependent economics of the post-industrial world and the increasing pace of natural disasters related to climate change, then it would appear obvious that a paradigm shift is in order. For too long has the 'western'/Euro-American paradigm strived after profit maximization at the expense of sustainability of natural resources. In the case of post-contact Nicaragua, a long history of exploitation of resources by Spanish colonizers and their elitist descendants has devastated an indigenous population about which we unfortunately know

scant little. This means that there is very little truly intact indigenous ecological knowledge that remains in western Nicaragua as a counterweight to the land-use system that has been introduced by foreign conquerors. That is not to say that there is no local ecological knowledge, particularly when defined according to Agrawal's five characteristics: community-based, contextually bound, non-individualist, holistic, and displaying a commitment to the local context (1995: 418). Agrawal further characterizes local knowledge as inherently flexible and adaptive, as "a dynamic entity that undergoes constant modifications as the needs of the communities change (1995:429)." It is this flexible and adaptive local ecological knowledge, borne out of generations of nuanced observations and with its roots in the very distant pre-conquest past, that needs to find greater valuation in academic and political circles in order to start approaching anything that even resembles sustainability. In the words of Roberto J. González in his *Zapotec Science*, "It is not enough to assume that the Spanish technologies were superior to those of the Native Americans or that their incorporation represented an evolutionary advance for Mesoamerican societies (2001: 70-71)."

Many would argue, and many have argued, that taking such a long-term view of landscape change as to look at aboriginal populations is not relevant to the present day. I would counter this argument by stating that technologies developed over the course of generations are more ably suited to provide adequate adaptive responses to changing climate regimes and natural disasters whose frequency is expected to increase. This is not meant to glorify pre-industrial societies, but to attempt to put them on equal footing in terms of the analytical structures employed when looking at human-environment relations. The new extensionist regime of agrobiodiversity, which includes the incentivization of silvopastoral systems among other local land management practices, has attempted to bridge the divide between the strategies of local producers and the global need for conservation of ecological services; but it is a long road indeed when trod at this pace, especially considering how rapidly

the agroexport industry has gained its global dominance through the course of the 20th century.

…

The relationship between people, cattle, and land degradation is historically, socially, and economically complex. It has been the subject of much academic debate since at least 1981, with the publication of Myer's "The Hamburger Connection." This debate has contributed to a discourse narrative that depicts cattle ranchers as "enemies of the forest and detroyers of natural resources (Szott et al. 2000: 43)", as opposed to subsistence-level agriculturalists who utilize a number of strategies and deal with a number of diverse stakeholders in order to reduce the risks inherent with being subsistence-level agriculturalists in a country that has experienced pronounced social, political, and environmental upheaval throughout its history. What seems to me more overt when standing atop Miramar hill, just outside of the town of Belén, is the pronounced differences in land use to the west and east of this overlook. In the hilly country to the west, one sees a mosaic of pasture, agriculture, plantain trees, forested watersheds, and the small settlements of subsistence-level farmers. The products of this landscape are almost entirely for local consumption, or else transported to Managua at the furthest. People are generally well fed and content, and practice much the same kind of agriculture as their forebears.

In the broad fertile plain to the east, one sees monocropped parcels of papaya, banana, and sugar cane, limited trees except for those used as windbreaks, and the profile of the Benjamín Zeladón sugar factory, with its channelized outlet directing its agrochemical wastewater into Lake Nicaragua. These lands are, for the most part, owned by large-scale investors; and the products of this landscape are exported considerable distances to foreign markets, and thence returned in the form of processed goods. Agrochemical input is immense, often sprayed by airplane to the detriment of the health of the cane-cutting workers below. If one seeks to finger-point at the dominant

cause of deforestation in tropical countries, it is the opinion of the author that this is the direction one should be facing.

The way is paved in rural Nicaragua for implementation of the 'second wave' of global conservation initiatives (such as the UN-REDD program): foreign economic assistance and PES schemes are no new thing here; the notion of ecological services is acknowledged; political power is sufficiently decentralized at present; money can make it straight to the producer and people will plant or preserve if paid to. But this is not going to solve the problem of tropical deforestation in Nicaragua or elsewhere. The metaphorical elephant is still in the room. The largest perpetrators of global environmental degradation are still the large agroexport corporations, their production practices, and the global consumptive practices that complete the cycle. Forests planted in agrarian landscapes do not "atone for industrial sins of emission" in high-income nations (Rocheleau & Ross 1995: 408). It is doubtful whether an economic incentivization could compel these corporations to alter their profit-maximizing land-use practices. It is the opinion of the author that money is not the solution to the problem of tropical deforestation; that the solution must revolve around conscience and responsibility, awareness and willingness on the part of the big players, corporations and politicians alike. But if history repeats itself, which it is prone to do, the problem will not solve itself until another big player, Nature, becomes so agentive as to dictate the next paradigm shift.

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A note on references: quoted translations which are my own are effected in italics; citations refer to grammatical phrase directly preceding grammatical mark; proper names and place names have been left in their original language with diacritics unaltered.

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