

Sustainable Farmland Investment In Brazil:

Reconciling Environmental Preservation with Agriculture Development

a white paper by Matthew Kruse, CEO of Genesis Investimentos

“...dearest brethren, I beseech you to get rid of the bad idea you have hitherto entertained of Brazil: to speak the truth, if there were a paradise on earth, I would say it now existed here... There is not a more healthy place in the world, nor a more pleasant country, abounding as it does in all kinds of fruit and food, so as to leave me no desire for those of Europe...What is more, in addition to yielding all the year, vegetable productions are so easily cultivated that nobody can be so poor as to be in want.”

-Letter from a Jesuit priest to his church in Portugal, 1560



I grew up on my family's farm surrounding Royal, Iowa, nearly 200 miles northwest of Des Moines. Royal is your typical farm community, boasting a population of less than 500 people. I am proud to be a 5th generation farmer. In 2012, together with my 83-year-old grandfather, I visited the farm in Denmark that my great-great grandfather, Knud Christensen, immigrated from in the late nineteenth century. Knud was intent to strike out on his own. He met up with other members of his family who had already settled in the new country. He made great sacrifices for a better future. His mother stayed behind in Denmark, and while he often wrote her, he never saw her again.

Growing up in Iowa, like most farmers around us, we raised primarily corn and soybeans. I would help out with chores where I could. My father taught me to drive the tractor when I was ten years old. He probably should have waited until I was eleven because I quickly proceeded to slice open one of our feed bins with the loader bucket. During my high school years, I raised 300 head of hogs for 4-H. Some of my best memories are showing those hogs I raised at the Clay County Fair, competing for the coveted trophy of Grand Champion Hog. As life would have it, a hog that I had spent the summer raising, yet was "attributed" to my younger sister who showed up at the last minute, won Grand Champion.

I was old enough to remember walking beans before Round-up Ready technology became mainstream. However, I was too young to remember much about the Ag Depression of the 80's. As did many farmers, my father struggled to support the family on income generated solely from the farm. This forced him to look for off-farm work. He had always been fascinated by the commodity markets. This is what led him to begin working as a Commodity Trading Advisor. While continuing to farm on nights and weekends, over the course of three decades he built a very successful agriculture risk management firm that we continue to manage to this day.

It was through this experience as a commodity trading professional, that my father took notice of the massive growth in Brazilian agriculture as what happened in Brazil was beginning to affect prices back home. And if it affected prices back home, you can be sure farmers everywhere were taking notice as it affected their bottom line. My father was curious and wanted to know more. I was just about to graduate from Iowa State University when he called me, asking if I would like to go with him to visit Brazil. At that time, I knew about as much about Brazil as most Americans do. I could tell you that Brazil was home to the Amazon Rainforest as well as Rio de Janeiro. And that was about it.

As I arrived in Brazil for the first time in 2001, I couldn't even tell you what the capital of Brazil was. I never would have imagined that five years later I would have been living on the Brazilian frontier managing thousands of acres of corn, soybeans and cotton. I never would have imagined that five years after that, I would be managing capital for hedge funds and private equity groups in Brazilian farmland. And five years after that, I never would have imagined having dual citizenship in both the United States and Brazil.

In chaos theory, there is a term coined the “Butterfly Effect”, where essentially any large event initially began as nothing more than a ripple. I often think how this situation applies to our every day lives. Had Knud never had the courage to leave his home country, my family would have stayed in Europe. Had the ag depression not occurred, my father never would have looked for an off farm job. And he undoubtedly never would have taken that first trip to Brazil. And had I won the Grand Champion trophy at the Clay County Fair instead of my sister, perhaps I would have stuck with raising pigs.

Much of the interest surrounding institutional investment in farmland began in 2009 when the Food and Agriculture Organization submitted a paper to the United Nations that global population would reach 9 billion people by the year 2050. And if that was going to happen, there was currently not enough food being produced to feed everyone. However, my story of moving to Brazil began seven years before that. US grain prices were depressed. \$2 dollar corn

If other industries can expand globally, why can't the American farmer?

did not make a profit in Iowa. Additionally, it was difficult to expand the operation. The competition for land was fierce, as those older, well-established farmers always seemed ready to bid up the price of land. While we are some of the strongest proponents of US agriculture, it only made sense to think outside the box when it came to our future expansion. Rather than expand by paying high prices for bordering land, which every good farmer tends to do, we wanted to diversify our interests. If other industries can expand globally, why can't the American farmer?

My same grandfather that I took to Denmark, was fond of quoting Mark Twain. He said, “Always buy land, they are not making any more of it.” Today we know both my grandfather and Mark Twain were wrong. Neither Mark Twain nor my grandfather had ever been to Brazil. On our first trip to Brazil we were blown away by what we saw. It was unlike anything we had seen in Iowa. The fields were massive. You couldn't see the planters making their rounds on the other side of the field. The soil was sandy, red and depleted of nutrients, as opposed to the nutrient rich, high clay, black soil of the Midwest. But the land was cheap. Very cheap. Land that would one day be comparable to land in Iowa, could be purchased at 1/15th the cost in Brazil. This meant the cost of entry was much less and we could operate on a size of scale virtually non-existent in the United States...or most places in the world for that matter.

The primary difference was the origin of the land. The virgin, undeveloped land, began as “Cerrado”, a savannah type prairie with small trees...not to be confused with rainforest. The “Cerrado” had to be cleared and transformed before it could be planted. Once cleared, the soils of Brazil were lacking in almost every necessary macro and micronutrient needed to grow a crop. It took fertility investment and time to develop the farmland. Often forgotten, parts of the midwestern corn belt went through a similar transformation in the late 19th century.

The transformation of Brazil's rural frontier was spectacular. It caught the attention of farmers, institutional investors, as well as the media. In the decade following our initial investment, you could barely go a week without reading some article about Brazil's growth in agriculture. But this also caught the attention of social and environmental groups rightly concerned about how this growth was affecting the environment. Conservation groups warned about how this transformation was going to take place and at what cost to the environment. In our journey to eliminate global starvation, we could not sacrifice or ignore the environmental and social impacts of reaching our objective.

Both negative and erroneous assumptions and conclusions were quickly formed. Many people incorrectly assumed all farmers were "chopping down" the rainforest...even though we were about 1500 miles from the Amazon. Other people were certain we were taking advantage of the local workforce in some way, they just were not sure how. This was frustrating to me, as the first farm we were completing the acquisition due diligence on, the local seller had his employees sleeping outside under black plastic. I will never forget what one of our investors said to me upon seeing this. He said, "I don't care if we make money or not, when I come back next time and if I see our employees living in conditions like that, I am selling my shares." One of the first things we did after purchasing the farm, was building quality homes for all of our employees.

Investors have come to realize that socially responsible investing doesn't necessarily mean a reduction to the bottom line. In fact, it can quite often mean just the opposite. An environmentally and socially responsible company attracts better managers, investors, lenders and partners. Rabobank even offers a reduction in interest rates for those clients that meet their standard of sustainability. The discussion surrounding sustainable farming practices will continue to develop. And so investors and operators need to be cognizant on what those issues are and make sure they have defined their own plan.

While I attempt to approach this paper with an open mind, I undoubtedly will have hidden biases. My background as a farmland asset manager as well as having spent a third of my life in Brazil will undoubtedly seep out at some point. Sustainability in Brazil can be a particularly sensitive subject; therefore disagreements are to be expected. That is after all, the point of this paper, to help add a single step toward our journey of a thousand miles towards defining sustainability. Therefore, if this paper were not at least mildly controversial, I would be doing the sustainability debate a disservice.

In our journey to eliminate global starvation, we could not sacrifice or ignore environmental and social impacts of reaching our objective.

WHY BRAZIL?

Brazil often receives heightened scrutiny because:

- It has more land available for expansion than any where else in the world
- It is the second largest food exporter in the world supplying 7% of global food demands.
- The land available for development is encroaching upon much of the Amazon Biome.
- Brazil is still an emerging country and thus is viewed as not ready or able to take care of itself.

Brazilians are annoyed by this last sentiment as the Amazon is a matter of national pride and they take it very seriously. In 2009, President Luiz Inacio “Lula” da Silva gave a defiant reply to world critics attempting to meddle in how they oversee the Amazon saying, “the Amazon belongs to Brazil and not to foreigners....the rest of the world already destroyed much of their own rainforest at the expense of economic progress.” (Folha de Sao Paulo, 2009)

The mantra of “the Amazon is ours” has been drilled into the minds of young Brazilians since they were born. (Rohter, 2010) This has created a sense of both paranoia and nationalism among Brazilians, as they strongly believe that they, and they alone will dictate the future of their unique natural resources. Please keep this in mind while you read this paper. Foreigners often arrive with an attitude of “we know best”. To Brazilians, you are merely a spectator, a guest so to speak. Brazilians are the ones who have the unique and overwhelming responsibility of finding balance between progress and the environment with one our greatest natural resources gifted to us.

As President Lula pointed out, many countries have a poor track record when it comes to social and environmental sustainability when it comes to economic progression. The primary difference is that Brazil’s transformation comes at a more modern point in history when the world is more interconnected like never before. It is their turn to find balance between a modern day civilization and that of its pre-colonial origins. Furthermore they must do it under a microscope of global scrutiny as the entire world watches in judgment. Imagine if Youtube was available during the relocation of American Indians in the 19th century? What if Facebook was available during the creation of the DustBowl of the 1930’s? Undoubtedly, these social and environmental transgressions would have led to world condemnation. This is not meant to impede readers from forming their own opinion, but rather provide historical context grounded in reality.

WHAT IS SUSTAINABILITY?

Legos, the one hundred year old Danish toy company, recently announced that, in order to become more sustainable, they will begin manufacturing a portion of their legos from sugarcane. Public response seemed to be overwhelmingly positive. I found this to be both amusing and contradictory as sugarcane farmers in Brazil (the largest producer of sugar in the world) have often been vilified as having a significant impact on the environment. To its credit, the sugarcane industry has made significant improvements at reducing its footprint on the environment. However, it seems contradictory that the public views sugarcane as lacking in sustainability where as the use of that very product to make legos somehow makes it acceptable. For me, this only reinforced much of the public confusion surrounding sustainability and what it actually is.

Websters dictionary defines sustainability as: **relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged.** I was eager to understand the positions of those opposing agricultural development. I was surprised that some of them described sustainability as the complete absence of any agriculture activity altogether. Based upon Webster’s definition of the word, both contrasting forces need to exist for there to be sustainability. If one of those parties is absent, then sustainability does not exist. Additionally, we don’t just want them to exist. Ideally, we want them to exist in harmony. Therefore, sustainability only occurs when two opposing forces come together to find a balance or commonality. This paper will operate under the concept that true sustainability means agriculturalists should not be allowed to eliminate our natural habitat, and likewise, environmentalists should not be allowed to eliminate food production altogether.

Governments tend to categorize sustainability into two primary groups, environmental and social. Most of this paper will focus on the environmental, as most of the controversy surrounds this topic. However, the social aspect of sustainability is just as important, especially in a country like Brazil who has a long history of social injustice. Even after slavery was abolished in 1888, attitudes and mentalities continue to reinforce this type of behavior. A common theme captured on Brazilian soap operas, is that of an elite upper class, highly dependent upon a servant class, and that servant class is most often of African descent. Brazilians tend to minimize the impact that slavery and modern day racism have on their culture by often pretending it does not exist, preferring to point

the finger at the United States who often portrays its own checkered history of racism through the public medium such as Hollywood movies. But in a country like Brazil with one of the widest gaps of income inequality, it is very easy for the have's to take advantage of the have-nots.

In the time I have been in Brazil, social sustainability has made tremendous progress. In a discuss on sustainability, an ag lender once told me that he was much more concerned of having his clients accused of some sort of slavery, than that client not being able to pay their loan back. The banker understood that the repercussions from being seen as financing an operation that takes advantage of their employees would be far worse than a single loan default.

There are those who have dedicated their careers to help create consensus in the industry as to what is considered sustainable. One of these professionals admitted that the advancement of sustainability got off to a rocky start. The message was ill received by many, as farmers and ranchers were treated as "the bad guys doing something wrong." This same sustainability professional concluded that jumping to conclusions by immediately vilifying farmers was not productive. As environmentalists and farmers work together, they have discovered more similarities than differences. I discovered for myself that as I attempted to shed light on sustainability in this paper, that surprisingly most farmers are currently engaged in at least some form of sustainable practice.

BACKGROUND ON BRAZIL

Brazil's land transformation was facilitated greatly by the soybean plant. After first being introduced to Brazil in 1882, it is reported that soybean production became commonplace in the state of Sao Paulo by Japanese immigrants in the early 20th century. By the early 50's, the USDA was exchanging soybean genetic material with Brazilian scientists that were testing varieties at several locations across the country. Breakthroughs in soil research soon followed. Genetic research continued through the 1960's when American agronomists funded by the USAID began testing US varieties across Brazil. One such agronomist was Dr. Colin McClung who years later won The World Food Prize in 2006 for his contributions to eliminating world hunger and improving human nutrition.

The Cerrado region of Brazil was considered a massive "wasteland" up until the 1960's. It was agronomists like Dr. McClung who proved through their research that with the correct fertility improvements such as dolomitic lime and traditional macronutrients, the Cerrado could be made suitable for production of crops. By counteracting

the aluminum toxicity in the acidic soils of the Cerrado, agronomists were able to provide the key to transforming one of the single largest farmland areas in the world since the development of the US Corn Belt. (World Food Prize, 2015)

Co-inciding with the advancements in soil development in the 50's and 60's, the then President of Brazil, Juscelino Kubitchek, developed and executed a plan to move the capital of Brazil off the eastern coast from Rio de Janeiro, to a newly planned city. This city became known as Brasilia. Brazil's development was primarily limited to the East Coast. Few people ventured into the interior of Brazil, and those that did sacrificed modern amenities, choosing to live on the frontier. The concept of building a planned city from scratch by the government and relocated the capital to such a city was revolutionary. Imagine the US President at the time, Dwight D Eisenhower, announcing to the country that he would be relocating the government from Washington DC to Middle-of-no-Where, Wyoming.

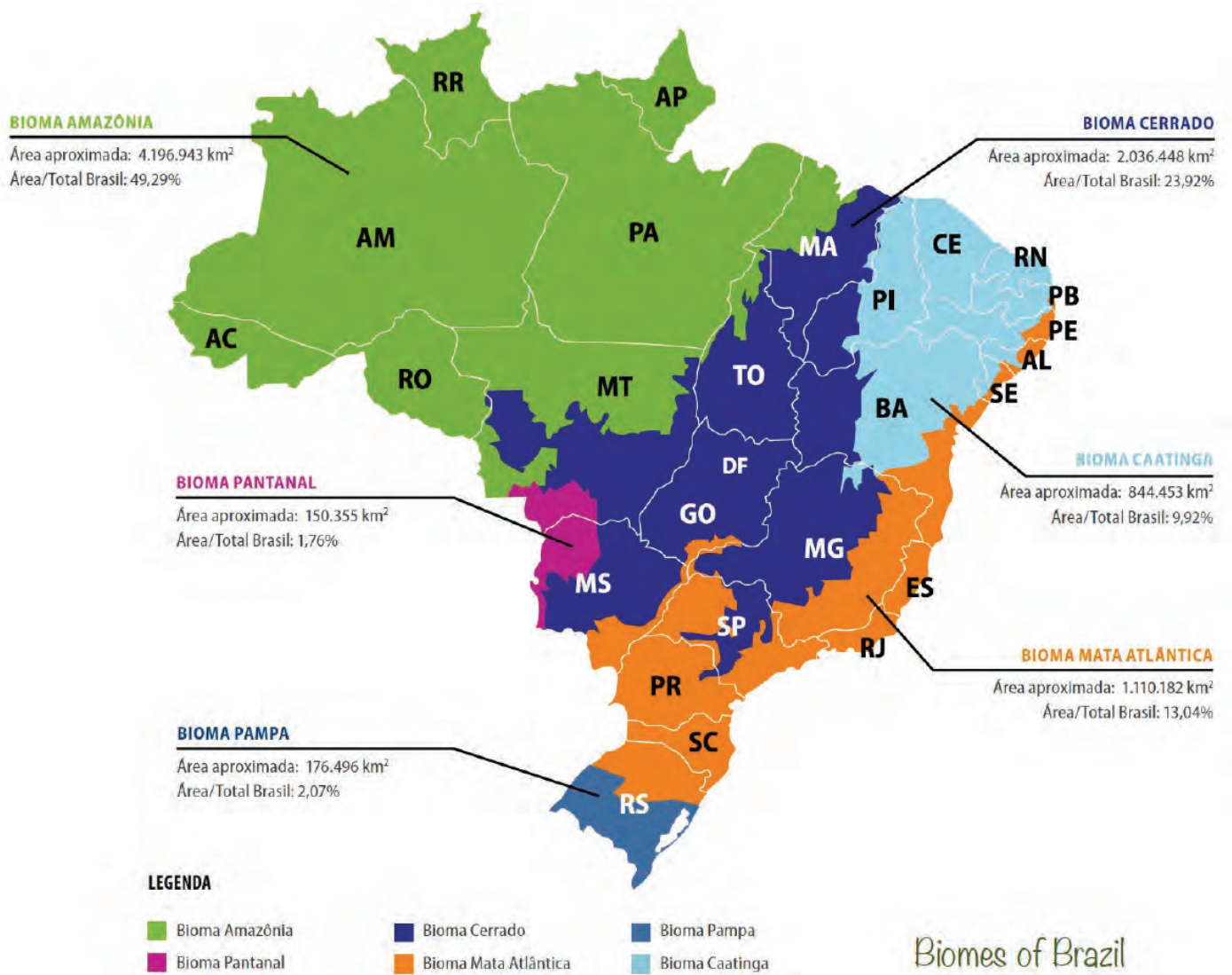
The plan worked. With the creation of Brasilia came jobs and investment, which fueled the economy and created a gateway to the frontier, 750 miles away from the beaches of Rio de Janeiro. Over the following decades, word spread of opportunities in the frontier. Much like the American settlers began moving west in the nineteenth century, Brazilians began exploring the frontier regions of their country. Cities on the frontier literally grew from nothing. The city that I called home for over ten years, Luis Eduardo Magalhães, literally began in the early 80's as a truck stop. This truck stop grew from a couple of guys selling diesel fuel out of a metal tank. Today this same frontier city boasts a population of nearly one hundred thousand people with a movie theater and a new shopping mall.

Most cities on the frontier followed the same Modus Operandi. First come the settlers looking to grow the family farm from the southern part of the country. All of the support services then follow behind them, such as equipment, parts, fuel, and food. This created a hotel and housing boom as those people needed a place to stay which then fed more demand for services. The population then swells, often outpacing services typically provided by the local government such as asphalt, law enforcement, and health care. Once this city reaches a threshold of where it is no longer considered "new", the migration continues and the cycle repeats itself creating yet another city deeper into the frontier.

From only 200,000 hectares of arable land in 1955, Brazil has well over 60 million hectares in cultivation today. (CONAB, 2018) Take note that most of this growth took place in the “Cerrado”, and not the Amazon Rainforest. Before we go further, it is important to help clarify the difference between the two ecosystems. Most people have heard of the Amazon Rainforest. The Amazon region covers an area equal to roughly 80% of the United States. It is the worlds largest remaining rainforest which still contains 20 percent of the world’s fresh water and an estimated ten percent of the Earth’s wildlife allowing for unparalleled biodiversity. Despite being so large, much is still unknown about it due to its harsh environment. Despite its inhospitable nature, its mystic allure draws researchers and conservationists from all over the world.

It has even drawn US Presidents to help map small portions of it. Post-presidency, Theodore Roosevelt, a well-known conservationist and explorer helped map a major Amazonian tributary called the River of Doubt in what is present day Mato Grosso. They renamed the river after him in his honor.

The Amazon almost stretches from the Pacific to Atlantic Oceans. The River basin begins in the Andes mountains in Eastern Peru. By the time the River even reaches the border of Brazil, it already produces more water flow than any other river in the world despite increasing another 500% before discharging into the Atlantic Ocean.



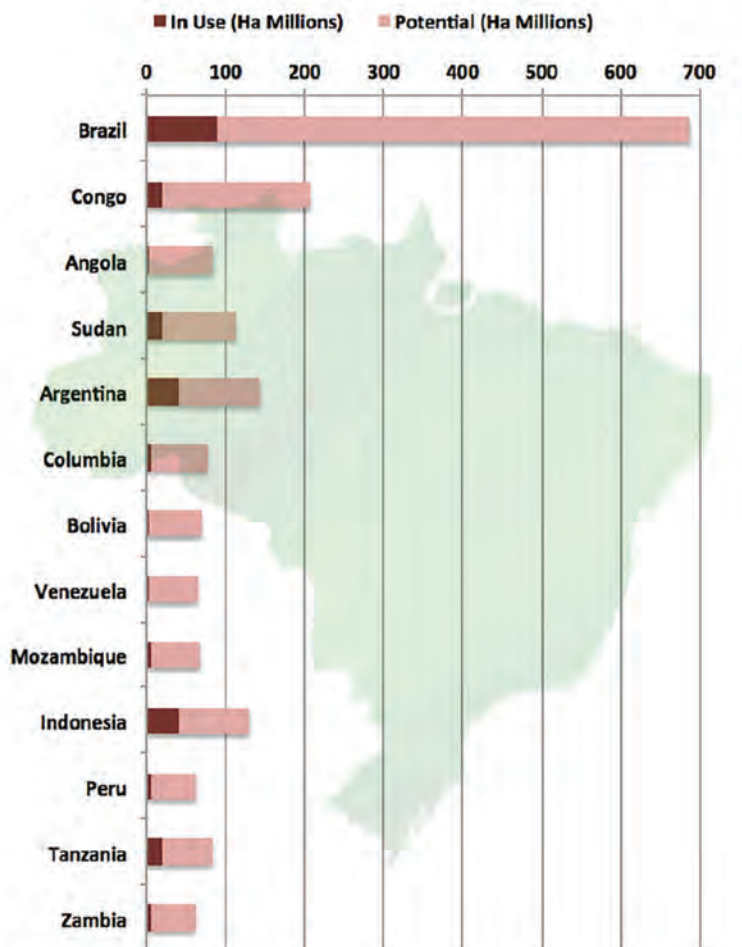
Much of the Amazon's ecosystem can be described as large trees with thick vegetation, high precipitation, humidity with seasonal flooding patterns at low elevation. The Cerrado on the other hand, is mostly found on top of plateaus in a more dry to moderate climate with relatively small vegetation covered by crooked trees and bushes. Representing roughly 20% of the country, Brazilian agriculturalists and government ministers regard it as having limited, to no conservation value, especially when compared side-by-side with the Amazon. It is true that the Cerrado does not carry the same status of "National Heritage" that is afforded the Amazon in its constitution. (Mingle, 2016) Furthermore, the visual aesthetics of the Cerrado are much to be desired. While pictures of lush green trees are typically associated with that of the Amazon, it is just the opposite in the cerrado where much of the vegetation is stunted and warped due to years of adapting to dry seasons that occur annually. To the agriculturist, the beauty of a vast soybean field easily surpasses that of the Cerrado.

As The Economist noted, "Brazil has as much spare farmland as the next two countries together (Russia and America). It is often accused of leveling the rainforest to create its farms but hardly any of this new land lies in Amazonia; most is cerrado." (Economist, 2010) This statement is only meant to clarify for those that are unfamiliar with Brazil that the growth taken place for the most part, has little to do with the Amazon. For many environmental groups that do not believe in transforming a single hectare of natural habitat into a productive piece of farmland, this argument is irrelevant. Land transformation, no matter the location, is seen as unacceptable degradation to the environment. They would strongly contest the notion of the Cerrado offering limited conservational value.

WILL THE AMAZON/CERRADO DISSAPPEAR?

Much has been written about the complete elimination of the Cerrado. An article titled, "The Slow Death of Ecology's Birthplace" written in 2016, says the Cerrado could be completely gone by 2030. (Mingle, 2016) The title of this article appears contradictory to the rest of the article, as the author later clarifies that the Brazilian Forest Code stipulates that a percentage of the land farmed in the Cerrado (and Amazon for that matter) must have a protected reserve along with it. This reserve varies depending upon location. But at a minimum, the reserve is 20% of the tillable production area that must be in reserve and protected. Meaning the reserve must be left in its natural state. The closer you get to the Amazon, the higher this percentage is, reaching as much as 80%. So in areas of the Amazon biome for example, every 1000 acres of tilled soil must be accompanied by 800 acres of unencumbered rainforest. While this may do little to satisfy those with zero tolerance for any land transformation, it disproves the theory that all of the Amazon and Cerrado will be eliminated all together.

ARABLE LAND AVAILABLE IN DEVELOPING COUNTRIES



Source: FAO
Elaborated by: Genesis Investimentos

What is the Forest Code?

The Brazil Forest Code is a set of legislation passed in 1965, and again amended in 2012. It is aimed at protecting the country's natural resources, with the hope of eventual elimination of illegal deforestation. It is most well known for establishing legal reserve for landowners, allowing for what can and cannot be cultivated. While the most recent Forest Code amendment did not change the percent allowed for land transformation, its primary contribution was the creation of a new land ownership registration acting under the Brazilian abbreviation CAR (Cadastro Ambiental Rural). CAR is a legal requirement to be eligible for the lower interest rates offered with public loans through Brazil's central bank. By incentivizing landowners to register their land with state agencies, they are better able to monitor, track and penalize any illegal deforestation. The use of CARS has been widely accepted in the agriculture community. Despite large drops in illegal deforestation, environmentalists still argue as to whether this is attributed to the CARS program.

While Brazil's Forest Code has been widely adopted and credited with establishing parameters of land use, these incentives were not considered to be enough in the environmental community. The Forest Code remains a contentious topic of controversy as environmentalists see it being the only thing standing between the forest and the farm. "To be effective, the Forest Code must be tied to economic incentives that reward landowners who conserve native vegetation," according to co-Raoni Rajao of UFMG. (McGlinchey, 2014)

A study done in 2016 called "Limits of Brazil's Forest Code as a means to end illegal deforestation" is used to defend this position as the authors conclude that while the Forest Code has the potential to halt illegal deforestation, it falls short of its promise to do so. "To end deforestation, Brazil must realign its financial and policy incentives to encourage this outcome. The fate of the country's forests hangs in the balance." (Azevedo, 2017)

For many environmental groups... land transformation, no matter the location, is seen as unacceptable degradation to the environment.

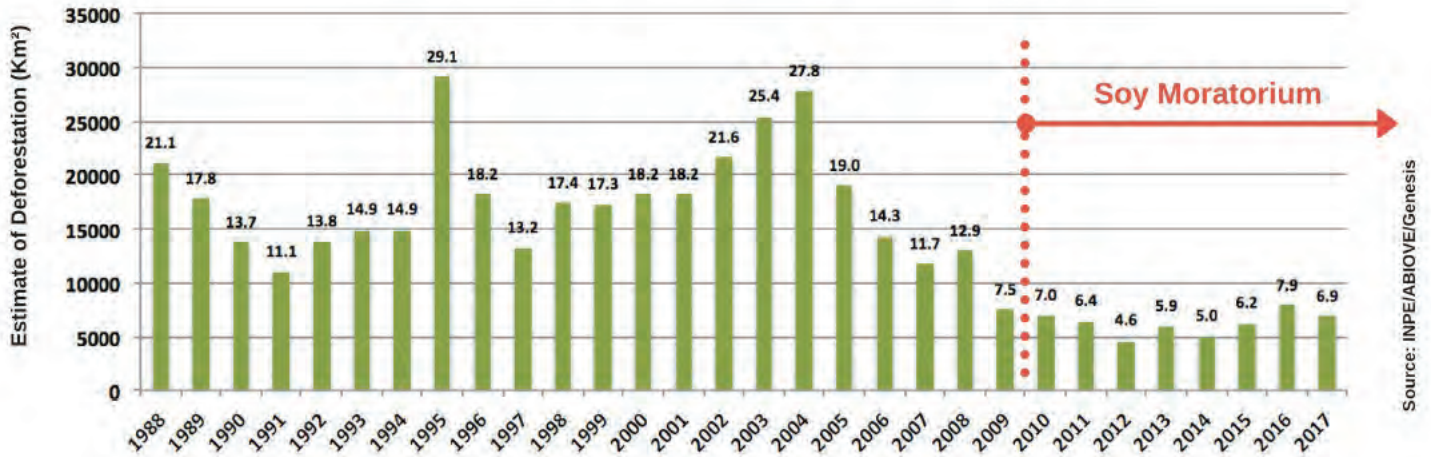
These critics would be justified in emphasizing that not all participants are respecting the Brazilian Forest Code. According to The National Space Research Institute (INPE), the agency responsible for monitoring illegal deforestation, land clearing has been slowing but is far from being eliminated. In a twelve-month period between August of 2015 and 2016, INPE satellites showed an area of 7,989 square kilometers had been deforested. (Espacias, 2016)

This is 798,000 hectares. That is roughly equivalent to an area the size Boston, MA that was deforested in one year. It's worst year of deforestation was in 1995 when 2,910,000 hectares was deforested in a single year.

This demonstrates a clear vulnerability in Brazil's sustainability. While they harness satellite technology with the ability to track and quantify micro environmental disruptions from space, they lack the resources to enforce them on the ground. The consequences of being caught in illegal deforestation are substantial. Everyone is aware of them, and yet much like a thief to a bank, the financial windfall is too enticing. The fundamental driver behind the illegal deforestation is an economical one. Land that is cleared and produces a crop is worth three to four times that of land in its natural state. As long as this is the case, the rainforest will always be at risk.



ANNUAL RATE OF AMAZON DEFORESTATION



The same factors that make the Amazon worth protecting, are the same ones that make it difficult to protect. It is so large, distant and isolated, that it is difficult to police. How does one proficiently and successfully monitor an area as big as Europe when there is limited access to roads, telephones and the internet? Brazil has not yet found the perfect answer, but it has provided a potential solution in the form of the Paris Climate Agreement. Signed in 2016, Brazil aims to reach zero illegal deforestation by the year 2030 as well as restore 12 million hectares in the next twelve years. That is an area the size of England. While this would be considered a tremendous feat of stewardship, for some environmentalists it is still not enough. Critics argue that while deforestation is down by 80% since 2004, progress has flat lined in the last few years. Additionally, Congress is reviewing measures to make it easier to get licenses to clear land. Environmental proponents believe that this will only encourage continued illegal deforestation.

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With the Forest Code settled, environmental groups have shifted their focus to private initiatives designed to create awareness and influence policy. They are working to form alliances with global commodity buyers, lobbying them to boycott any grain produced on newly deforested land. More than likely this will create the desired response from farmers as this approach will directly affect their financial resources. If buyers for commodities produced on illegally deforested land is eliminated, it is logical to assume that illegal deforestation will meet the same fate.

One of those private groups seeking to build awareness in the agriculture community is the Gordon and Betty Moore Foundation.



Interview with
Leonardo Fleck

Program Officer at the Conservation and Market Initiatives
Gordan and Betty Moore Foundation

The Gordon and Betty Moore Foundation is the largest private foundation focused on global environmental conservation practices. Since 2001 they have allocated nearly U\$400 million in grants to “ensure the long-term ecological integrity and climatic function of the Amazon basin.” Their foundation has identified Brazil as a strategic location as it accounts for 74% of the total protected area in the world.

Several years ago, the Gordon and Betty Moore Foundation concluded that with the major growth taking place in and around the Amazon basin, it was going to put at risk much of their conservation initiatives. Therefore they began building strategic alliances with major players in the supply chain that potentially source raw commodities from that region. Through their conservation initiatives, they have developed three pillars to execute their platform. Those pillars are:

- A)** Engage with companies that have commitments around the risk areas. So far sixty-one companies have joined from around the world that want to work with Brazilian stakeholders to maintain sustainability.
- B)** Develop tools that help companies know where to operate and where to avoid. One of those tools is a new app called AgroIdeal (www.agroideal.org/en/). AgroIdeal maps out soy and pasture land to help companies plan their expansion in a more sustainable manner. Agroideal's first stage of development is currently focused more on soy traders, but they will have a version for beef processors in the near future. The challenge with Agroideal is the land grabbing and speculation potentially happening on community lands. According to Leonardo, up to two million hectares of Cerrado that is public land is unallocated, meaning it is under government control but has not been identified for a specific use nor is it well identified. The challenge is that colonizers may have settled on these properties as long as forty years ago, making it their home. There are reported cases where they forged documents to show ownership to the land, making it their home. Many decades later the government still dealing with this problem.
- C)** Work with government agencies and other organizations to incentivize them to improve land quality. Brazil has one of the largest farm bills in the world called Plano Safra, which is primarily made up of short term, subsidized lending for farmers. However, there are little to no sustainability criteria for farmers to get loans. By adding environmental criteria such as compliance with the Forest Code, Adoption of rotational grazing of cattle, it will incentivize farmers to become more compliant.

One of the challenges to long-term sustainability is that Plano Safra is a short-term federal credit plan, as most credit is a one year loan that must be paid down and then reapplied for each year. This makes adopting long-term sustainable practices difficult when the lending resources only last twelve months. Their foundation would like both the government and multi-national companies that offer barter systems such as exchanging cash for grain at the end of the season, to establish more long-term credit. As global grain traders tweak their barter system to include criteria to loan money, this will continue to incentivize farmers to make changes.

Leonardo's ultimate goal would be to see broad consensus along the private sector in the supply chain. He would like to see widespread adoption of the belief that more conversion of ecosystems is bad for them in the long-term. Farmers should continue to focus on optimizing land that is already opened. He believes that more conversion lowers production because it disrupts temperature and rainfall. He believes this has not yet been properly communicated to

traders/producers. Producers have shown more resistance to these initiatives, as they are the ones that bear the burden. Multi-national traders are becoming increasingly aware of the risk of having assets that are “stranded”. By the end of 2018, they believe that there will be major announcements about new initiatives adopted by large traders and NGO’s that will help define what sustainable production will be. Their ultimate goal is that Brazil becomes a model of transparent and sustainable production.


According to Leonardo, these are steps foreign investors should take to ensure they are making a sustainable farmland investment:

- Make sure you are in compliance with Forest Code regulation
- Focus on improving existing land in production
- Consider restoring land that has been illegally converted to farmland

For more information on the Gordon and Betty Moore Foundation, visit <https://www.moore.org/article-detail?newsUrlName=the-importance-of-long-term-financing-and-management-of-brazil’s-protected-areas>

Agroideal is a new online tool designed to help all stakeholders in the agriculture and environmental sector acquire knowledge of their territory and promote its sustainable development.

The system helps assess risks associated with the expansion of cropland areas, searching for regions of high economic benefit and productivity, coupled with a low socio-environmental impact.




7 steps should be followed:

- step 1** DEFINE REGION OF INTEREST
- step 2** DEFINE A PLANNING UNIT
- step 3** SELECT AN AREA OF STUDY
- step 4** SELECT INDICATORS OF ECONOMIC OPPORTUNITY
- step 5** SELECT SOCIO-ENVIRONMENTAL RISK INDICATORS
- step 6** GENERATE THE RISK EXPOSURE MAP
- step 7** GENERATE REPORT

Territorial Intelligence is a multidisciplinary and a multi-sector approach to land use planning, which combines quantitative, qualitative and spatial methods. It is based on:

- Sustainable development as an alternative to a pure economic development perspective
- The relevance of the territories as planning space and zone for social action
- Building of a collective intelligence for future land use actions



As Leonardo mentioned, the issue surrounding early settlement of unmarked public lands is a complicated one. At first glance, it would appear that the settlers simply did not respect the government ownership. But that would not tell the whole story. There are specific cases where as early as the 1970's, settlers sought out the government on how to attain rightful ownership to land in the frontier. When they asked government officials what they could do to stake legal claim to the property, they were instructed to build a fence around the property to lay claim to it. But not before laughing at their request (at that time, the land was considered a worthless, barren wasteland). And so they did. These settlers built a fence around 100,000 acres (40,000 hectares). As time went on and people discovered the value of the land, interests and perceptions changed. Within forty years, the same county that those settlers were mocked by state officials seeking ownership, had one of the highest Gross Domestic Product values in the entire country. As recently as 2017, the county of São Desiderio had a GDP of over \$1 billion reais. (Globo, 2017)

As Brazilian farmers migrated to the northern frontier, the government was completely unprepared to provide adequate oversight. Farmers and settlers required more proof of ownership than simply building a fence. Courthouses did not have enough manpower to handle

the flood of requests for land ownership. Some settlers exploited the government's lack of preparation by forging land titles. This has created an organizational mess that they are still dealing with to this day.

The Gordon and Betty Moore Foundation have been very successful at building alliances behind the scenes to create awareness about environmental preservation. While environmentalists may view farmers as an obstacle to their goal of zero farmland transformation, farmers can actually become their greatest allies. One such example, is one of my former farmer neighbors in Brazil, Walter Horita.

Walter Horita, of Grupo Horita, has arguably been one of the most successful farmers in Brazil, experiencing tremendous growth in his career. When I first met Walter in 2001, he and his brothers were farming approximately 37,000 acres in the western region of Bahia. Today, they operate nearly 250,000 acres, making them one of the largest privately held farming operations in Brazil, and perhaps the world. Walter Horita is a leader in the farming community and is an example of sustainable farmland production, having served on local and state farming boards. He has provided the following analysis regarding finding balance with farmland sustainability.



Agriculture conserves nature in Brazil

by Walter Horita



With a territory of 851,576,705 hectares, it is no wonder that Brazil is a country of superlatives, for better or for worse. We are known for having a great diversity of biomes, luxurious fauna and flora, a tropical climate with abundant light and rainfall, and a relative shielding to natural disasters such as tornadoes, earthquakes, and tsunamis. On the other hand, we have major problems in politics and in our economy that not infrequently tarnish our image as a nation. We are always the object of suspicion, even when we do the right thing. This “distrust” comes not only from the eyes of the other, the foreigner, but from our own people who, in front of the mirror, see a distorted image of themselves.

This becomes even clearer when it comes to agricultural production, a sector in which the country has improved, through a massive investment in technology and good production practices, leading us to occupy a prominent place in the global supply of food and fiber. In the 2017/2018 harvest, Brazilian grain production is expected to reach 230 million tons of grains, in a modest 61 million hectares of planted area. Modest, it's true, compared to the entire Brazilian territory, of which agricultural production enjoys only 30.2%, and within this percentage, crops such as soybean, cotton, corn, and sugarcane compose only 7.8%. In the eyes of the world and of our society, we are the deforesters, the poisoners of springs and soils, unworthy of having in our territory the largest tropical rainforest in the world, plus the savannah and the abundance of fresh water that is included in this privileged geography.

The number presented by EMBRAPA for the cultivated area in Brazil of 7.8% is still slightly higher than the one published by NASA, of 7.6%. They are two very important sources, the latter being perhaps the most relevant, both because of the international weight of the institution and the fact that this is the viewpoint of one of our major competitors in the world market for agricultural products, the United States. The same EMBRAPA indicates that 66.3% of the native vegetation is preserved and that 20.5% of it is inside rural properties. Brazil has succeeded in producing more year after year, practically maintaining the same planted area. In the savannah in the last 17 years, the loss of native vegetation was 0.25% per year, and even then, it cannot be guaranteed that all this came from the expansion of crops, as cities and infrastructures continue to grow as well.

A mix of increased productivity and correct management of occupied area, together with crop rotation and conversion of old degraded pastures into productive crops, is responsible for the country's agricultural success. I do not want to point fingers at others, but for comparison purposes only, the United States maintain only 19.9% of areas dedicated to the protection and preservation of native vegetation, compared to 74.3% which is used for agriculture, according to the USDA.

Due to strict environmental legislation which, in the savannah, establishes the conservation of 20% of the native vegetation in farms, and that can reach 80% in the Amazon region, breaking records of food and fiber production in Brazil is a great achievement which should be praised, for starters, by all Brazilians. If the Legal Reserves are preserved from the gate inward, it is not wrong to say that, contrary to common sense, agro is the main reason for the conservation of plant patrimony in Brazil.

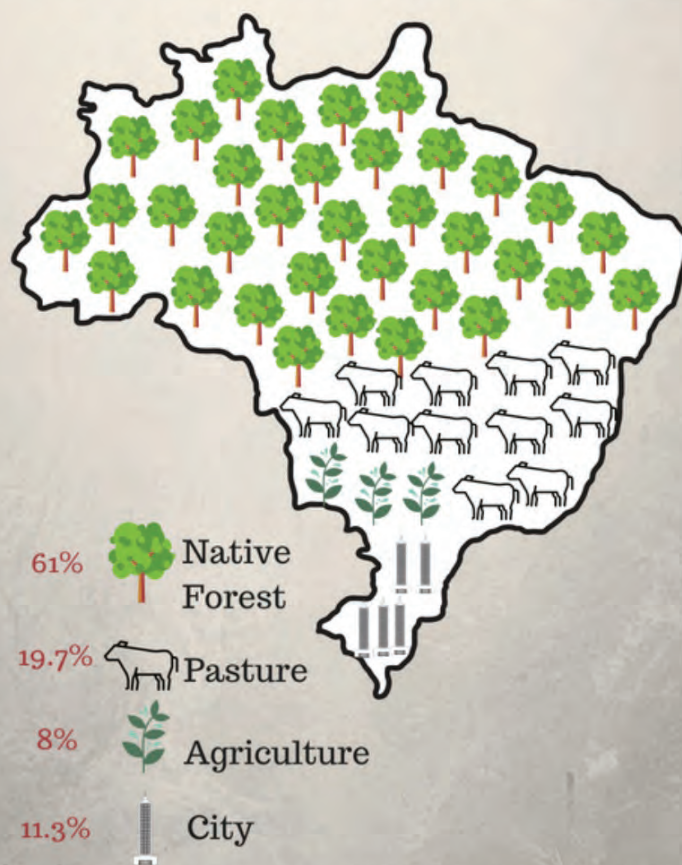
(*) Walter Horita is a Mechanical Engineer from the University of São Paulo (USP) and a rural producer in Bahia's western region.

As Mr. Horita demonstrated, farmers like him are actually the ones complying with and enforcing the forest code in Brazil. So if farmers are the ones enforcing the forest code, does that not mean that they are in fact helping to preserve the environment? But if that is true, then why does illegal farmland transformation exist? Unfortunately, there will always be those looking to take advantage of the system. There have been bank robbers for as long as there have been banks. But nobody blames the actual bank for this. Nobody says there should never be another bank ever again because somebody might rob them someday. Similarly, for those 99.9% of farmers who do follow the forest code, they often feel vilified by the actions of the other 0.1%.

Mr. Horita's farm is located in the Cerrado basin and thus is subject to a 20% reserve. In the case of Mr. Horita if he is farming 250,000 acres, that means he also owns, according to the Brazil Forest Code, at least 62,500 acres of reserve in its natural state. That is 62,500 acres that he protects. That is 62,500 acres that he acts as the caretaker for, making sure no harm comes to it. It was land that was purchased and yet no income is derived from this property. Nothing is planted on it. It cannot be used for hunting. In other words, the Horita group is also one of the largest owners of natural preserve in the Cerrado basin and he gets nothing for it. Virtually all farmers that I know in Brazil operate with the same code, which is to maintain ones reserve in accordance with the law. Rarely does this side of the story get told.

As I mentioned earlier, the closer you are to the Amazon, the higher the reserve mandate is. While farmers are often considered as the root of the problem for environmental conservation, ironically, they are the largest owners of the Amazon rainforest, keeping it protected in its natural state. In most cases, paying thousands if not millions of dollars for an asset they know will never generate a single dollar of income.

Percent Land Use In Brazil



Source: Genesis Investimentos/IBGE/EMBRAPA

Sources such as EMPRAPA and NASA have confirmed that the land area used for agriculture in Brazil is currently at just under 8%. Brazil is often compared to the United States due to its approximate size and resources, where in fact 20% of land is being used for agricultural purposes. Additionally, forestland accounts for roughly 28% of land in the United States, compared to 61% in Brazil.

THINKING OUTSIDE THE BOX

Credit Suisse recently provided an article challenging the status quo where GDP assumes natural resources are free. The article titled, "The Future of GDP" begins, "If planet Earth was a company, it would send us a huge bill for the natural resources we have used and the damage we have caused to the environment." They argue that there is a tremendous disconnect between the environment and the economy. They reference a study completed by the former Trucost group which identified "U\$7.3 trillion of unpriced natural capital expenditures which equates to roughly 13% of global economic output in 2009". They argue that many of the production processes taking place would not be profitable if environmental outflows were taken into consideration.

I find value with this concept but perhaps not for the same reasons. If there were in fact an added environmental expense category (lets imagine it right next to depreciation), then it is only fair to assume that for those that are preserving the environment, it would add value. Since the basic premise of supply and demand would allow for their to be a relationship of cause and effect, meaning if there is cost on one side, there is benefit on the other and vice versa.

As Brazilian farmers are essentially caretakers of much of the Amazon and Cerrado Basin, it would seem plausible that it may be in their best interest to redefine how GDP is used. Redefining GDP would perhaps provide the necessary financial incentives environmental groups are advocating for to help farmers continue to justify its preservation. These financial incentives would be long term, and not based on short term metrics currently used by the average Brazilian financial system. Today, legal reserves account for a very small percentage of farmer's balance sheets. Banks and lenders typically do not place much value on legal reserve, other than the fact that they simply need to show it exists. This would have to change if GDP reflected an environmental category.

Farmers still have an expectation that if they forgo developing their land, they should be compensated. Land is almost always the most significant asset on a farmer's balance sheet. Asking them not to develop that asset can have a severe negative impact to their business not to mention the fact it runs counter to their primary business objective. Some have found value in the concept of reimbursing farmers for leaving land in its natural state. (Caetano, 2018) There are many farmers who have the legal right to convert their property to something more productive. The only reason they may have not done so is

lack of capital. Meeting sustainable criteria can already be a challenge on those under capitalized farmers. Some land owners may find it attractive then to leave land unencumbered in exchange for compensation.

One of the challenges to this would be to determine when we begin to calculate for environmental impact. Does it begin immediately? Does it begin retroactively 20 years ago or 100 years ago? Does it pertain

to only those in the agriculture industry? While farming attracts most of the attention, urban sprawl and other industries such as mining also have had an equal if not greater impact on the environment. Brasilia, the capital of Brazil for example, was built nearly 60 years ago from scratch, right in the center of the Cerrado.

One of the greatest architects of urban sprawl comes from the United States where urban areas are increasing at roughly 400,000 hectares (1 million acres) per year. That equates to the combined areas of Los Angeles, Houston and Phoenix. To help put that into perspective, this amounts to roughly two-thirds of the average annual deforested area in the Amazon Biome within the last few years. (*based off of six year average from 2012-2017)

WHY CAN'T FARMERS JUST PRODUCE MORE FROM THE ACRES THEY ALREADY HAVE?

In my research, this was a common expression used by environmental advocates. If only farmers could flip a switch in a factory to simply turn on more production. To those whose livelihoods do not depend upon farming and have never been exposed to it, I can understand this sentiment. However, it cannot be stressed upon enough that farming still depends upon factors beyond our control. The principal factor being Mother Nature. It is human nature to believe we have a high-level of control over their destiny. But that is not always the case when it comes to farming. To have a successful crop to sell, farmers spread millions of dollars of expensive seed, fertilizer and

Ironically, they are the largest owners of the Amazon rainforest, keeping it protected in its natural state. In most cases, paying thousands if not millions of dollars for an asset they know will never generate a single dollar of income.

chemicals on the ground in hopes that it will not just rain, but rain at precise levels and at precise times. Additionally, adequate temperatures are needed to provide heat units to generate photosynthesis. Modern day agriculture has made tremendous progress at reducing its risk to weather. It has developed seeds resistant, but not impervious to both drought and insects. It has developed tillage systems designed to reduce water loss in the soil, improve organic matter and reduce erosion. But at the end of the day, farming still needs rain and sun for it all to work. It is widely dependent upon Mother Nature. And if you don't get just the right amount, it doesn't matter how many cutting edge technologies you have adopted.

There is a misperception among those outside of production agriculture that those farmers who simply don't focus on producing more with what you have, are not good farmers. There could be nothing further from the truth. I never met a farmer who did not want to produce more than the year before. I never met a farmer who was not actively trying to grow his production in some way. Those that are not involved in production agriculture on a day-to-day basis have grabbed a hold of a couple of buzz words in an attempt to feel informed. No-till, cover-crops, sustainability are not a guarantee for increased production. If it were, you can be sure that every farmer would adopt them. If only it were that easy.

Farming is similar to other industries in that it needs volume to work. You have fixed costs and those costs won't change. Apple needs to sell a certain number of iPhones to make a profit. Coca-Cola needs to sell a certain number of coke cans to make a profit. And farmers need to sell a certain number of bushels of grain to make a profit. Nobody would think it logical to ask Apple or Coca-Cola that they have to stop producing after reaching a certain volume. Why would we think it is acceptable to ask farmers, who unlike Apple are comprised predominately of small businesses, to stop producing at a certain volume? Apple and Coca-Cola can always strive to produce more with less. Coca-Cola can recycle old cans to make a new can. This will help reduce their costs and increase margins. But at the end of the day their greatest profit comes from increased volume. They are always looking to sell more cans of coke.

Likewise, farmers continue to produce more with less. As an example, Brazilian farmers produce twice as many soybeans per acre as what they did nearly 30 years ago. There is a clear uptrend with farmer yields. But there is only so much they can do. Buzz words to not automatically increase yields by 5%, and unfortunately there is no magic switch.

DO WE REALLY NEED MORE FOOD?

According to the FAO, world population growth is widely expected to surpass 9 billion people by the year 2050. That is only 32 years away. Once that happens, global food production will have to increase by 70% to meet that demand. More importantly, the food supply will need to come from developing countries like Brazil due to their land availability. Developed countries like the United States have already reached a level of maturation. Furthermore, countries like the United States have greater competition for land use than other countries do such as urban development.

There exists a perception among higher-level income households that food supply is plentiful, cheap and abundant. Unfortunately, among lower-income households this perception is not fact as the wealth inequality gap continues to widen. Food companies continue to develop new marketing techniques that cater to high-income households such as organic, gluten-free, non-GMO. A higher level of discretionary spending allows these individuals the advantage of multiple options at the supermarket. A side effect of this is that these people often find themselves in a bubble, unaware of the realities faced by other people. While shoppers at Whole Foods are trying to decide which gluten-free, non-GMO quinoa is best, others don't know where their next meal is coming from. The image of hunger is usually that of a small child in Africa surrounded in poverty. But we can actually find it in wealthy countries such as the United States.

According to Feeding America, the nation's largest domestic hunger-relief organization, 46 million Americans rely on their network of food banks for support. Furthermore, one in six children in America struggle with hunger. (Feeding America) Ironically, there is a food bank in Des Moines, Iowa, less than ten miles from a Whole Foods.

In Brazil, extreme poverty affects some 44 million people, or roughly 20% of the population where families live on an income of approximately \$1 per day. According to Andrew MacMillan, FAO's Director of Field Operations, "In Brazil, hunger means having a half-full plate or perhaps just eating one meal a day. Over the long-term this is debilitating for the population and it weakens the development opportunities of a country rich in potential like Brazil." (Soria, 2003)

The Food and Agriculture Organization has supplied financial aid to Brazil through the form of the Zero Hunger project, aimed at providing additional income to enable

people to buy basic food items. Brazil demonstrates an interesting dynamic where despite being a breadbasket, many of its own citizens still suffer from hunger.

WHAT PROGRAMS ARE IN PLACE TO REDUCE ILLEGAL CONVERSION?

ABIOVE, the Brazilian Association of Vegetable Oil Industries, is made up of thirteen grain processing companies that purchase soybeans from all over Brazil. According to ABIOVE, the soybean complex has created 1.5 million jobs through 17 different states. The Brazilian agriculture industry has had such a large impact, that it is cited as one of the primary reasons for general economic progress. United Nations have identified a clear improvement in Brazil's Human Development Index. Between 1990 and 2015, Brazil's Human Development Index as calculated by the United Nations has increased by 23.4%. (United Nations, 2016) Agriculture production has laid the foundation for economic development generating jobs and investments that otherwise would not have taken place. Nevertheless, ABIOVE seeks to "reconcile economical development with that of environmental preservation". Together with ANEC (Brazilian Grain Exporters Association), they created one of the most successful platforms aimed at reducing illegal deforestation in the Amazon Biome. It is called the Soy Moratorium. Members of the Soy Moratorium have pledged not to trade and finance soybeans originating in deforested areas within the Amazon Biome.

ABIOVE has gone as far as declaring that the Soy Moratorium was so successful, that any deforestation taken place after 2006 has had little, if any correlation to soybean cultivation in the Amazon Biome area. In the Soy Moratorium's 10th anniversary, which took place in the 2016/2017 crop season, they identified 47,365 hectares of soybean area that

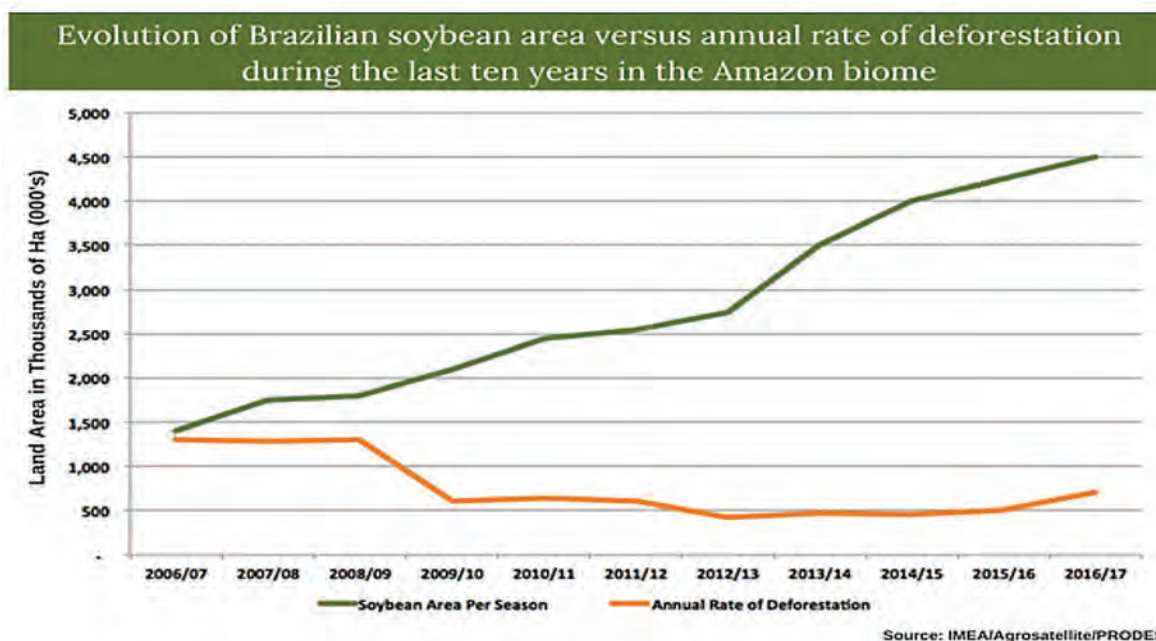
...only 1.2% of land conversion from 2006 until 2016 was attributed to soybean production. In other words, 98.8% of deforestation is coming from other industries like lumber, coal and livestock pasture.

was not in compliance. In other words, only 1.2% of the land conversion taken place during that ten-year period was attributed to soybeans. That means that 98.8% of deforestation is coming from other industries like lumber, coal and livestock pasture. This would also mean that the successful lobbying effort of grain originators from sourcing soybeans in these areas, would have very little impact.

In speaking with Bernardo Pires, manager of Sustainability for AIBOVE, he confirmed that illegal deforestation in the Amazon is roughly one-sixth of what it was ten years ago. What they have yet to take into consideration is how much forest has been regenerated which would offset the calculation for forest reduction even further. Mr. Pires added that so much pressure has been applied to eliminating illegal deforestation in the Amazon, he is concerned there may be unintended consequences. For example, the reduction of illegal deforestation in the Amazon may lead to an equal increase in illegal deforestation in the Cerrado.

Mr. Pires's goal for Brazil is that someday all of the farms will be 100% compliant with the Forest Code. As the forest code already provides for very strict regulation on what farmers can and cannot do on their land, he believes that a farmer has met the definition of environmental sustainability by adhering to the Forest Code. He believes going beyond that is not sustainable. Mr. Pires confirms that it is a tremendous financial burden for farmers to only be able to utilize 20% of their property. And asking them to do more than that is not realistic. The example he provided was if someone purchased a house with five bedrooms, knowing they will only ever be able to use one of them.

According to Mr. Pires, "Following the Forest Code is already a significant contribution to the environment. It is absurd that environmental groups ask producers to go beyond that by not agreeing with any farming activities at all on their properties, even when allowed to."



Mato Grosso Institute of Agriculture Economics (IMEA)

Interview with Daniel Latorraca Ferriera, Superintendent of IMEA

IMEA has a privately held non-profit research organization that helps public and government organizations with sector-related information and analysis. IMEA has been providing industry research for twenty years.

How relevant is the question of sustainability to farmers in Brazil?

It is very relevant. Farmers today understand the importance of adopting sustainable farming practices. Most of them are trying to do the right thing. They respect the Forest Code. With 90 million hectares in Mato Grosso, 65% of that is currently protected, meaning it will remain in its natural state. This has been confirmed by Empraba and other government organizations. Production has already been increasing on existing areas despite a drop in land transformation.

How have you seen the issue of sustainability change in the last ten years?

Has it gotten better or worse?

It has gotten much better in the last ten years. Land transformation has dropped by 80%. Grain production continues to increase despite this, much due to the fact that cattle pasture is being converted more and more to grain production as opposed to utilizing forest for grain production. While pasture area has dropped approximately 1.7 million hectares, the number of cattle continue to increase. From 2008 until today, there are 4 million more head of cattle, reaching nearly 30 million head in the state of Mato Grosso. We also see farmers adopting new planting systems such as integration of field and livestock. Rather than planting corn as a second crop, some producers are instead using livestock in rotation with soybean areas.

With 90 million hectares in Mato Grosso, 65% of that is currently protected, meaning it will remain in its natural state.

What should investors know regarding the debate of land transformation?

The new Forest Code has finalized this debate for us. We finally have legislative and judicial security that defines what can and cannot be done. The producer has the right to do what he wants with his land in accordance with the Forest Code law.

How do you define sustainability?

Producing something for the world in a way that it creates economic development but lives in harmony with the local vegetation.

What suggestions would you give to investors coming to Brazil to invest in land with regards to sustainability?

There are currently many frontier areas in Mato Grosso that can be expanded to in sustainable manners and we hope to provide some general guidance on how to do that. IMEA is actually working on a guide for new investors looking to invest in Brazil. We expect to launch it shortly.

ENVIRONMENTAL CHECKLIST FOR AGRICULTURE PROPERTIES

Item	Investment	Implementation	Payback	Complexity
Environmental License	\$			
Rural Environment Registration (CAR)	\$			
Legal Reserve	\$			
Permanente Preservation Area	\$			
Restricted Use Areas	\$			
Georeferencing	\$			
Well License for Pumping Water	\$			
Chemical Depository	\$\$\$			
Used Chemical Depository	\$\$			
Recycling of Chemical Containers	\$			
Organic Residue Program	\$			
Program for Discarding Used Tires	\$			
Program for Discarding used Bateriaes	\$			
Fuel Depository	\$\$\$			
Oil and Gas Depository	\$\$			
Facility for EPI Storage/Cleaning	\$\$			
Equipment Cleaning Area with Caption Tank	\$\$			
Recycling Storage Area	\$\$			

Interview with
Aline Camargo Aguiar,
Head of Sustainability, Rabobank

Of all the organizations in Brazil's ag sector, few would have their finger on the pulse of sustainability more than Rabobank. Rabobank's operations in Brazil focus exclusively on the ag sector. Wherever there is a cluster of agricultural production, they are there. They currently have lending activities in at least thirteen different states in Brazil. They have no restrictions on where they can operate, including the Amazon Biome. Their lending portfolio typically makes up the largest farmer clients in the country. As farmers rely on working capital sources, Rabobank wields tremendous influence. With a portfolio of 1,300 farmer clients and approximately 150 ag businesses, their mandates will have considerable impact on defining and maintaining sustainability across the country.

When Rabobank first began operations in Brazil in 2004, "farmers still had a very raw understanding of what sustainability meant," according to Aline Camargo Aguiar, Rabobank's head of sustainability. According to Aguiar, "farmers today have a much clearer understanding of what sustainability means on their farm. Farmers are much more conscientious about the impact they are having on the environment. We are still a long ways from what I would consider ideal, but I believe farmers are now headed in the right direction. For example, farmers that irrigate, want to be sure the water will not just be there today, but it will be there for future generations. If the farm is sustainable, there is a better chance the farmers children will continue to be involved in the operation."

Rabobank maintains a physical presence among all of their clients farms. They hire agronomists to visit the farms, typically on a weekly basis, to not just observe the crops they are financing, but to also make sure their farms are in environmental compliance using sustainable best practices. Aguiar gave a hypothetical example of a child living on a farm that did not have access to schools. Rabobank would continue to work with the client as a lender, designing a customized "action plan" in ensuring children on the farm have access to education. "The goal is to work with the producer and keep the doors open. That way we can continue to educate them and help them improve over the long term. If we shut the door on them because we find something we think is less than desirable, they are less likely to improve," according to Aguiar.

There are some situations where Rabobank draws the line. According to Aguiar, "We don't provide financing to farms who have deforested lands illegally. When we do our due diligence on a potential farmer client, besides the obvious financial analysis, we also have an environmental checklist. We are very much aware of the clients environmental standing which allows us to analyze whether or not he meets our criteria." As a former client of Rabobank, I can attest that they are very thorough in their analysis. If there are specific items identified for improvement, Rabobank will make a formal list and sit down to discuss them. While the actual line of credit may not be dependent upon immediate completion of this list, Rabobank diplomatically applies the correct amount of influence to make sure it eventually gets done. Lack of capital does not work as an excuse, as Rabobank is ready and willing to fund projects necessary to meet those goals of sustainability.

Aguiar hopes that Brazil and the ag industry continue to dedicate more man power to provide environmental oversight. Additionally, transparency is very important. Companies should be encouraged to publicly announce things they are doing or progress they have made. This will create a spirit of transparency and persuade more groups to get involved. One of the biggest challenges according to Aguiar, is changing the human mindset. "I want farmers and the ag industry to follow sustainability practices, not just because they have to follow some rule set forth by someone else, but because they want to."

Perhaps that is what true sustainability looks like. When all parties involved have committed themselves to best practices of sustainability, not because they are compelled to by some environmental agency, bank or legal enforcer, but because they want to.

RABOBANK Best Practices in Sustainable Agriculture (Boa Praticas Agrícolas Socioambientais -BPAS):

- 1) Pasture Management/Water Conservation:** This can include several methods but one in particular is creating a barrier, typically a fence line keeping cattle away from rivers and their respective Environmental Protection Zones (APP). In doing so, the river water stays cleaner, and plants native to the river are not spread by the cattle to other areas of the property.
- 2) Green Fertilizer:** In the United States, this would probably be referred to as cover crops. By using non-commercial plants designed to be used in crop rotation to help reduce erosion, increase water retention in the soil, reduce soil temperature and increase organic matter. Varieties typically include but are not limited to millet, sorghum, brachiaria and crotalaria.
- 3) No-till:** This refers to a method of planting directly into the natural vegetation of the previous seasons harvest residue, with no conventional tillage (ex: disking, cultivating, subsoiling). The primary benefits of this system are reduction of soil erosion, an increase of organic matter and less fuel expense.
- 4) Alternative Energy Generation:** The most common example in the sugarcane industry is using bagasse (residue from sugarcane processing) to feed their generators. In most cases, this system not only provides for all of their energy needs to run the mill, but also generates excess electricity which can be sold to the public grid. Other innovative examples include using solar panels on farms to become self-sufficient.
- 5) Integration of Field/Livestock Forest:** This is a strategy of integrating several production systems in the same area with the goal of using less land to maintain production, or increasing production without needing more land. This system most often refers to the combination of eucalyptus and livestock, where cattle are free to graze on pasture between and around rows of trees.
- 6) Compost:** This refers to organic residue supplied from the decomposition of agriculture production. Manure from livestock is probably the most common example, which can be applied to fields. One specific example I used in Brazil was applying gin trash to our fields. The gin trash comes from the plant residue separated from the cotton fibers in our cotton gin. The residue was mixed with fertilizers. With the proper addition of moisture and sunlight, it eventually turned into compost, which we then applied to the fields as fertilizers.
- 7) Crop Rotation –** This refers to planting a crop different than the previously planted crop. This is widely adopted by farmers as it commonly accepted to help reduce weed and insect pressure, thus reducing costs and improving yields.
- 8) Erosion Control:** Some of the most effective methods for controlling soil erosion include previously stated criteria such as no-till, cover crops, and crop rotation.
- 9) Integrated Insect Management:** This relates primarily to the responsible use of chemical pesticides. Factors include utilizing chemicals with low toxicity to humans and applying said chemicals quickly. It can also include using technology to combat insects or soil fungus. A popular example is utilizing GMO seed, such as Bacillus Thuringiensis, commonly referred as Bt, which is lethal to specific insects.
- 10) Social Environment Certifications:** This is a tool used to help provide further orientation for Best Practices as well as add value to the social and environmental standards in the agriculture supply chain. It helps consumers differentiate between other products and improves sustainability awareness.

Perhaps that is what true sustainability looks like. When all parties involved have committed themselves to best practices of sustainability, not because they are compelled to by some environmental agency, bank or legal enforcer, but because they want to.

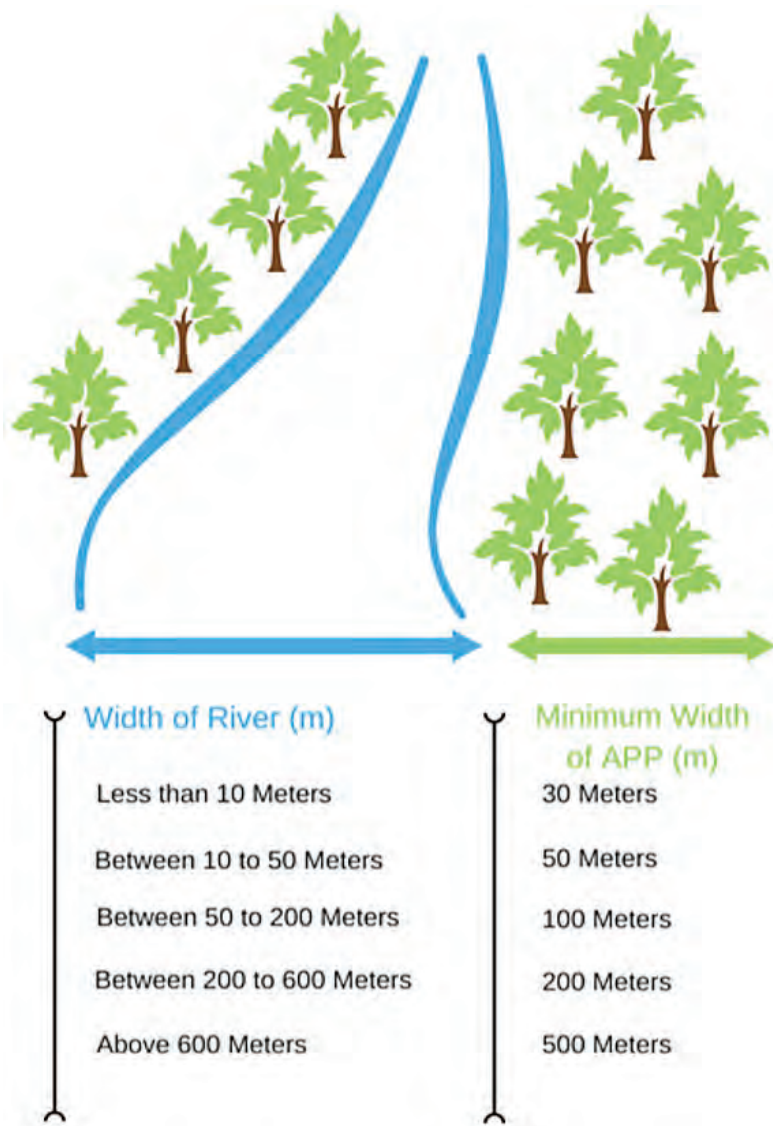
You can find more information on Rabobank's Manual of Best Practices at:

<http://www.rabobank.com.br/en/images/Manual%20on%20best%20social%20and%20environmental%20practices%20in%20agribusiness.pdf>

HOW DOES THE FOREST CODE PROTECT THE RIVERS?

In addition to legal reserve, land along riverbeds is highly monitored and scrutinized. The Forest Code strictly prohibits the use of any land along river margins. This land is referred to as the Permanent Preservation Area or its abbreviation APP (Área de Preservação Permanente). You should never find land in Brazil immediately adjacent to rivers being used for any agricultural use. Regardless of whether the type of vegetation along the river, the Forest Code stipulates a minimum distance be kept surrounding rivers which depends upon the width of the river. The wider the river, the wider the band of protection.

The logical objective is to preserve the water resources through geological stability by maintaining the soil and native vegetation.



**Sustainability:
It doesn't happen because we don't know what it is!!**

*By Beatriz Domeniconi, Executive Coordinator,
Sustainable Working Livestock Group, July 19th, 2018*



It's hard to put into practice something we don't understand, isn't it? We don't know where to start, we aren't sure how much it will cost, or whether it will even be worth the effort. This is exactly what has happened to sustainable production. Despite being a word repeated so many times in our day to day, would you know exactly what sustainability means? Could you describe a sustainable production system? And sustainable livestock, what is it?

Most often, sustainability is associated with environmental issues. People who have heard or read about it define it as "the tripod" - social, environmental, and economic. But 'in practice', what is it about?

For livestock, this issue was primarily associated with major concerns about the environment, especially illegal deforestation and climate change. For consumers of meat, leather, and milk, a concern about the impact they would be causing on the planet; for industries and supermarkets, the concern to guarantee the origin of the products offered; for banks, the reputational risk of financing activities harmful to the environment; and for most producers, the risk of exclusion from the marketing process, often without being clear of the criteria considered.

We may think that sustainability is the 'ability to sustain' - ensuring that a given activity is perennial, that it is possible to accomplish it over time at a quality equal to or greater than the one at the moment. To do this, you must know and manage well all the resources (money, people, soil, water ...) needed for the activity so that they do not run out or lose quality over time.

To be sure that it will be possible to continue producing over time, it is necessary to have guarantees, such as documentation of the land, compliance with labor and environmental laws, and records that guarantee the origin and destination of the products, such as invoices and animal transit guides. It is necessary to guarantee the safety and the quality of life of the employees, as well as to enable them for the functions they perform. Soil quality must be maintained, ensuring good water filtration and pasture development. Protect water sources and maintain their quality. Ensure the health and welfare of animals. But how to do all this and still make money from the activity?

*...sustainability is
not limited to a
location, but rather
is a process.*

Above all, it is imperative that the producer knows her production costs and guarantees the economic viability of her activity. All activities must be planned and appropriate to the environmental conditions and the investment capacity. Sustainability is much more associated with the adaptation of the activity to the available conditions and the continuous evolution, than with a specific objective. Take it one step at a time and continue to improve always. Most producers already practice sustainability, but they don't know it.

A product is not sustainable because it meets specific criteria, for example, because it is organic, because it is not transgenic or because it is not related to deforestation! A product is sustainable when its production, processing and marketing systems take into account all the environmental, social and economic aspects to be considered. No single criterion defines what sustainable production is, and trying to prioritize one of them in order to streamline the process of sustainable development creates confusion, prejudice and makes it even more difficult to understand which practices should actually be implemented.

WHAT ROLE DOES CATTLE PRODUCTION PLAY IN A SUSTAINABLE BRAZIL?

Cattle production is one of the most traditional agriculture practices in Brazil. While the total estimate for head of cattle varies depending upon what source you use, most everyone agrees that Brazil maintains the largest head of cattle in the world. ABIEC estimates there are over 221 million head of cattle. This is over twice as many cattle as found in the United States, however the US still produces more beef due to its intensive feedlot system compared to Brazil's typical grass-fed pasture system. The primary consequence of Brazil's grass fed system, is that it requires much more land.

While the traditional Pampas regions in Argentina and southern Brazil are most closely associated with cattle grazing, cattle pastures have completely perforated throughout the entire country. In the 1970's, the Brazilian government offered tax incentives for companies that were primarily located around urban areas like Sao Paulo to make investments in frontier regions like Mato Grosso. Their goal was to help incentivize private development in areas of the country that were for the most part, extremely remote and uninhabited. Over time, it worked. Companies invested in land.

The catch was, they had to do something with it. They could not just let it sit idle. Cattle production was a logical fit as it was a low-risk, low reward investment.

Over the last several decades, cattle production has been steadily increasing due to improved technology in seed genetics as well as adoption of improved pasture management techniques. The vast majority of cattle in Brazil are Nelore, whose lineage dates back to India in the 1950's. Nelore have adapted well to the warm, tropical climate of Brazil due to their tolerance for heat.

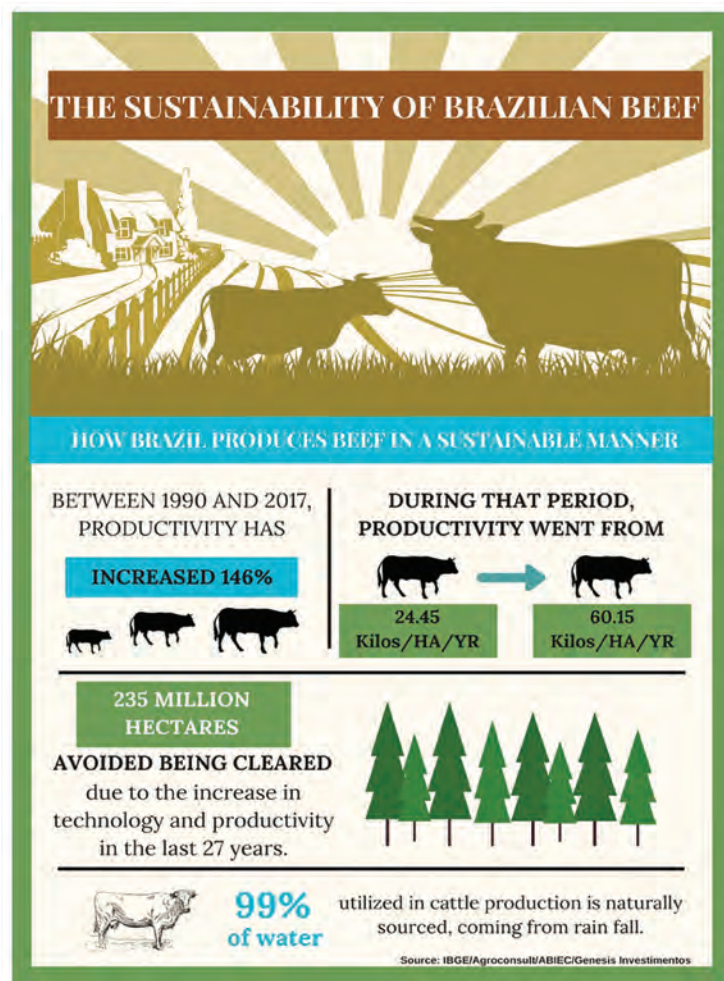
The livestock industry arguably has a greater impact on the sustainability of Brazil more so than any other industry. This is due to the fact that they occupy more land than row-crop agriculture. The industry is keenly aware of this and as made great strides at reducing their footprint on the environment. One such group that has made it their mission to define sustainability in the livestock supply chain, is the Sustainable Working Livestock Group (Grupo de Trabalho da Pecuaria Sustentavel), or GTPS. GTPS is an association made up of voluntary members representing various sectors within the livestock supply chain. Their members include producers, processors, banks, NGO's (the Gordon and Betty Moore Foundation is one), universities

and research institutions. They work to create awareness regarding sustainability amongst every party involved with the livestock industry, not just producers. GTPS was a precursor to the global round table on sustainable beef. Their goal is

to reach both a national and global consensus on what sustainability looks like in the beef industry.

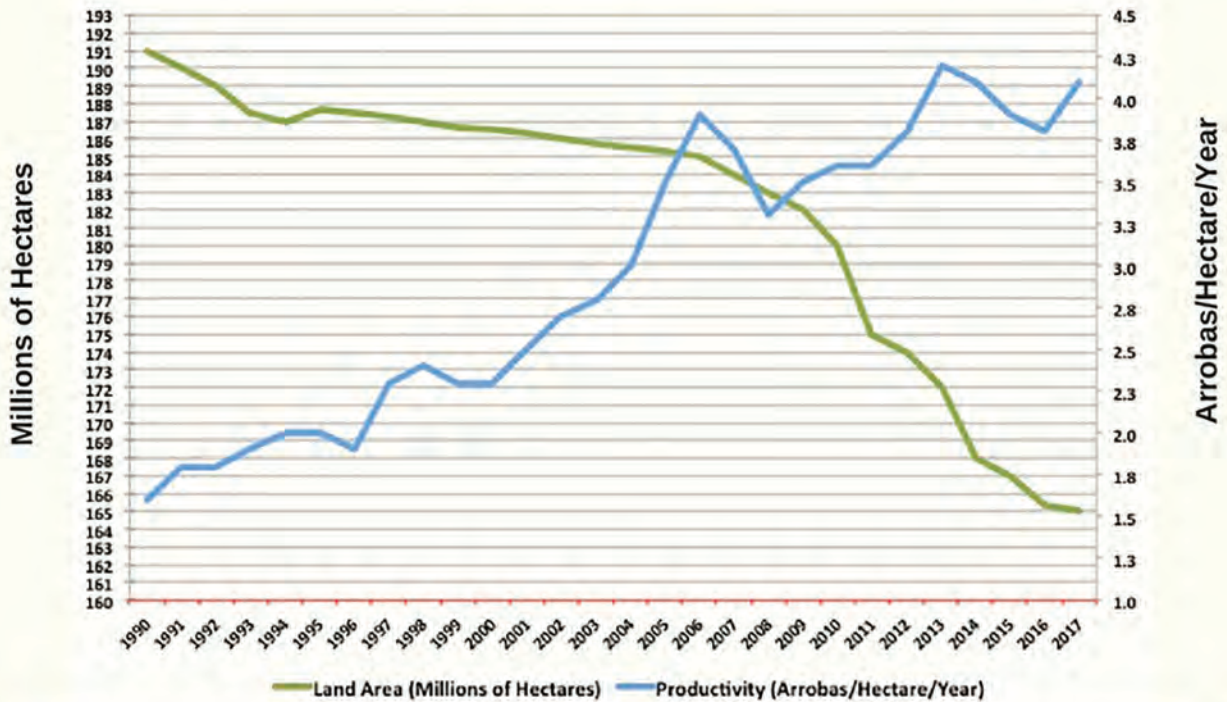
As the livestock industry makes up an important part of the Brazilian economy, it is necessary that it be allowed to continue to flourish, although in a sustainable manner.

The Brazilian Association for Beef Exporters has provided the following graph which demonstrates the tremendous improvements in beef production sustainability achieved over the last couple of decades. There is an obvious negative correlation between land demand and beef production. While land under cattle pasture has dropped approximate production has tripled. Industry experts expect this trend to continue.



THE LAST SEVERAL YEARS, BRAZIL HAS REDUCED ITS AREA OCCUPIED BY CATTLE, WHILE AT THE SAME TIME INCREASING ITS PRODUCTIVITY

Brazil's Evolution of Cattle Pasture and Beef Production



By 2027, beef production will increase 45%, eliminating the need for ten million hectares of pasture

Source: ABIEC/Agroconsult/IBGE/Genesis Investimentos

In speaking with Beatriz Domeniconi, Executive Coordinator of Sustainability at GTPS, she confirmed that there is still much confusion related to defining the concept of sustainability because most people still consider it an environmental issue. Most discussion revolves around illegal deforestation of the Amazon when it involves much more than that. She believes that a cattle farm in the Amazon Biome can be sustainable, while a cattle farm in the traditional Pampas region of Brazil may not be. The product that is being created, in this case beef, is sustainable because of its process, not just because of its location. A sustainable beef production system must be one that is on going, and not just a one-time occurrence. This sustainable

process must include respecting legislation, respecting our human resources (people) and applications of ag inputs. One of the greatest challenges for GTPS is the size and diversity of the livestock sector. Pasture makes up 20% of the countries territory and it is spread out across the entire country, with little concentration in any one region. Production systems and styles vary dramatically from region to region as the adoption of technology and information fluctuates. The challenge for GTPS is to connect producers through all of the various associations and supply chains. Certification is also difficult because of the difference in production systems.

One of the greatest contributions to sustainability experienced by the livestock sector is an increase use of technology, allowing for greater production. In Brazil, the typical low-income cattle ranch produces 5 arrobas per hectare. Through the use of fertility investments, improved cattle genetics and water distribution systems beef production can increase dramatically. Within 6 to 10 years, producers can achieve at least 40 arrobas per hectare, there by multiplying their production 8 times, potentially more if they adopt a confinement system. While beef output is their key metric for success, producers can also reduce methane omissions by as much as 90% per kilo of beef produced compared to the low-income model. Through the adoption of technology, land value can potentially double. (Micol, 2018)

While there is an obvious interest to adopt this production system, the biggest obstacle is a lack of liquidity. Most ranch owners are unable to implement these systems simply due to lack of capital and management. Improving pasture can cost as much as 3,500 reais per hectare (approximately U\$1,000/hectare). (Micol, 2018) The Brazilian Rural Credit system does provide financing for pasture improvements, but loan volumes are small and insufficient.

While land under cattle pasture has dropped approximately 25 million hectares since 1990, beef production has tripled.

GTPS 5 Principles of Good Practices

- 1) Management of the Production: Producer must know their cost and revenue and need to control it like any small business does.
- 2) Communities: It is important to know the community where they are and not have any conflicts with local people.
- 3) Workers: Respect the employee legislation and provide technical capacity through education and training for workers to perform their job efficiently.
- 4) Environment: Know and Respect the legislation. Develop a soil and water management plan.
- 5) Value Chain: Adopt a Genetic and Health Management system that follows sanitary practices such as vaccinations. This includes the responsible use of inputs.

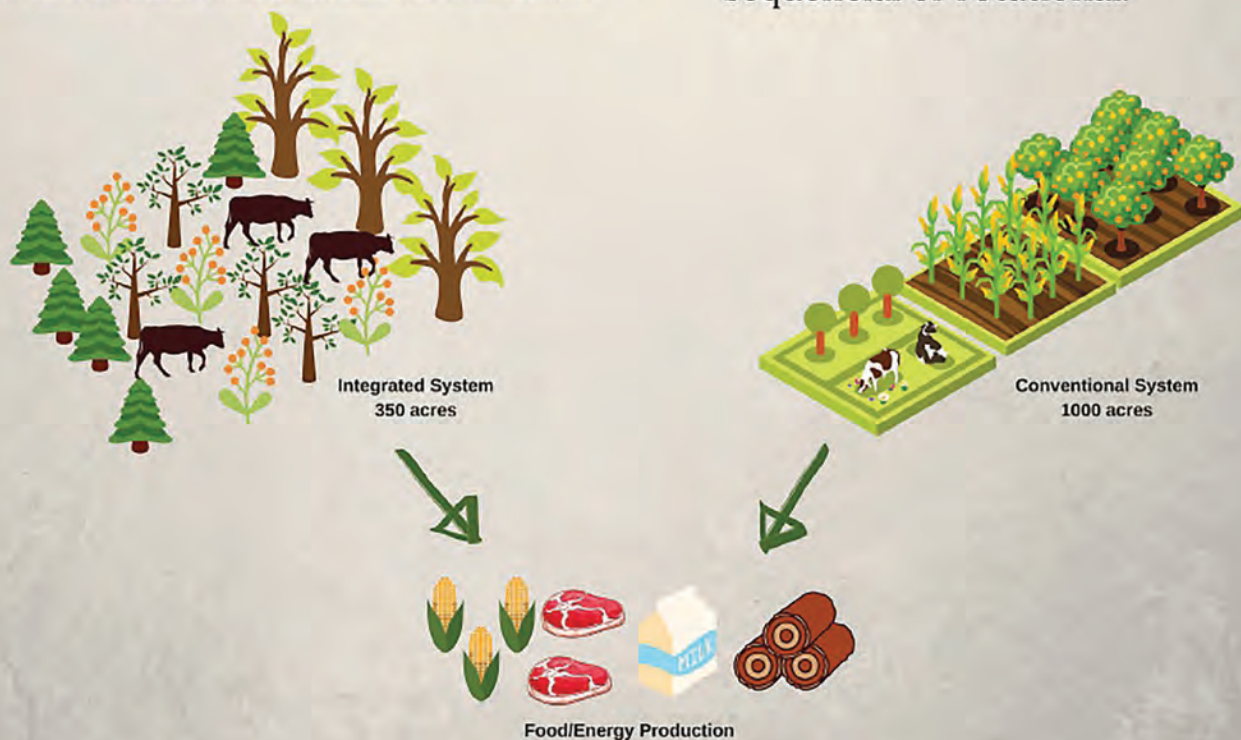


FIELD-LIVESTOCK INTEGRATION SYSTEM (INTEGRAÇÃO LAVOURA PECUÁRIA)



WHAT IS IT?

The implantation of different productive systems such as grains, fiber, meat, milk and agro-energy on the same land area, using intercropping that is either sequential or rotational.



System Objectives:

- 1) Potentially increase production system efficiencies
- 2) Reduce cost on new production areas
- 3) Increase beef and feed production
- 4) Reduce pressure on land demand

Collaboration from: Luis Henrique Kasuya; Kasuya Consultoria
Matthew Kruse; Genesis Investimentos

One example of sustainable production systems in Brazil is referred to as the Integração Lavoura Pecuária, or Field Livestock Integration. The objective is to use intercropping on the same land area, to increase production. A positive side effect is the need for less land. Which crops are used may often depend upon the region you are in. One of the more common systems of Field Livestock Integration in the northeast part of Brazil is called Santa Fe. This is where a crop of corn is immediately followed by cattle pasture within the same season. While there are some success stories, the results of this system are far from conclusive. Timing is critical. It requires sowing pasture grass into recently emerged corn to give it adequate moisture but at the same time not competing with the corn. Once the corn is harvested, the pasture will begin to flourish, catching the last few rains of the season to allow for adequate coverage. This type of system would make American farmers squeal as they do everything they can do avoid having grass or weeds in their fields. Nevertheless, this system has interested Brazilian producers, because it allows for the possibility of increasing revenue, but it is not without risk. It requires more investment, more management and of course help from Mother Nature, none of which are easily accessible.

WHAT ABOUT SOCIAL SUSTAINABILITY?

So far, much of this paper has centered upon environmental sustainability. It is not my intention to minimize the social pillar of sustainability, as a farm cannot be considered sustainable without it. Brazil's progress for social sustainability has improved exponentially in just a short amount of time. At the beginning of this paper, I mentioned poor labor conditions on a farm that we had purchased. The mindset among farmers in Brazil has changed so much that seeing the same thing today almost seems unthinkable. Nevertheless, Brazil has not completely eradicated this problem. According to the International Labor Organization, 35,000 people have been rescued from slave labor in Brazil in the past 15 years. (International Labour Organization, 2018)

Brazil has cracked down hard on not just slave labor, but general oversight of working conditions. The Ministry of Labor has been delegated tremendous power, some say too much, when it comes to monitoring farming areas for non-compliance. Labor Department officials can appear on farmer properties without any notice and without any warrant, searching for any discrepancies. On an annual basis, they have the authority to increase minimum wages as they see fit, with minimum outside input. I remember attending one meeting where the labor department

delegates had determined they were going to increase minimum wages by 6%. Their rationale was that total soybean production area in the state had increased 6%, and therefore minimum wage should go up 6% despite the total land area having very little correlation to farmer profits.

The Labor Department is notorious for handing out fines, often being referred to as a "fine factory" for what some consider trivial things such as minimum vertical distance between bunk beds. (In case you are wondering, it is precisely 1.10 meters) Farmers complain that the labor laws are so complex, they don't even know where to begin. And rather than work with the farmer, they would prefer to fine them, offering no assistance in how to become compliant.

While it is frustrating to farmers, unfortunately the many must pay for the sins of a few. There have been too many examples of prior infractions, which have created the labor enforcement agency we know today.



As the labor department has chosen to teach through fines, farmer associations have become pro-active at achieving sustainability. Farmer led organizations have become extremely organized at helping to streamline sustainability, even allowing for certifications. One of those organizations is ABRAPA, the Brazilian Association of Cotton Producers. As cotton requires more manpower than grain farming, the average cotton farm has an even higher level of responsibility than your traditional corn and soybean farm.

Brazil is the 4th largest cotton producer in the world and a major exporter of cotton. 99% of the cotton produced in Brazil, is represented by ABRAPA. The remaining 1% being niche cotton markets such as organic or colored cotton. Of those producers who are associated with ABRAPA, 82% have been certified sustainable. (ABRAPA, 2018) It is called the ABR Certification, which is a Brazilian acronym for Responsible Brazilian Cotton.

You can learn more by visiting :
<https://youtu.be/gzswOyuds9c>

SUSTAINABLE FARMLAND INVESTMENT IN BRAZIL

The benchmarks used for the ABR Certification have been provided by the Better Cotton Initiative or BCI. BCI is a non-profit organization based in Switzerland, aiming to provide a global set of parameters for cotton production. They began as part of a round table in 2005 supported by those involved in the global cotton supply chain looking to ensure their cotton was being produced in a sustainable manner. (Better Cotton Initiative, 2018) In terms of total production output, BCI certified farms in Brazil make up nearly 36% of BCI certified farms worldwide. This makes Brazilian cotton a major player in the sustainable cotton market. By defining global criteria for sustainable cotton production, suppliers guarantee their product to the end user.

BCI WORLD VS BCI BRAZIL SAFRA 2014/2015

BCI	Producers	Area (Ha)	Production (Tons)
BCI Brazil	210	623,451	962,723
BCI World (estimate)	1,400,000	3,100,000	2,700,000
% Brazil of Total	0.015%	20%	35.7%

Source: ABRAPA/BCI/Genesis Investimentos

The three pillars of the ABR Certification are Social, Environmental and Economic. ABR defines social sustainability as:

- Following 100% the Brazilian Labor Laws (CLT)
- This includes formal employment registration, fair wages extra hours as per law, weekly days off and paid vacation;
- Safety in the work place;
- Lodging, meals, transportation, medical care, and recreational structure;
- Non-discriminatory treatment;
- Freedom to join unions and support collective bargaining
- Following 100% with ILO conventions - International Labor Organizations
- Following 100% in line with Regulating Norm 31, which controls safety, occupational health and work environment

Additionally, ABR participation has a zero tolerance policy when it comes to child labor, which it considers tantamount to slave labor. ABR upholds that by following the social pillar of sustainability, it will improve the third pillar of economic sustainability. By creating a safe work environment, and offering comfortable lodging, you can attract quality employees who in turn, help to boost employee satisfaction and will hopefully lead to higher productivity. These can be simple things. One of the main

things that my employees commended us for was that we paid their salary on time. This is a simple thing and it does not cost any money.

For those looking to earn ABR certification, a technician must come to their farm to evaluate them using a list called the Verification for Property Certification or VCP. This list is divided into eight criteria. It includes verification of:

- Employment contracts
- Prohibition of Child Labor (100% commitment)
- Prohibition of Work analogous to slavery or in degrading or unworthy conditions (100% commitment)
- Freedom of Association
- Prohibition of discrimination against persons
- Safety, occupational health and the work environment
- Environmental performance
- Good agricultural practice

Full certification can take up to four years, which at such time they must meet at least a minimum threshold of 90% for each of the criteria, except for Prohibition of Child Labor and Prohibition of Slavery which must meet the 100% requirement.

Employment contracts help specify whether a position is fixed or temporary. A challenge among farmers is that of monitoring and tracking employee hours. Hours must be tracked digitally, accounting for overtime hours. The standard work shift is 8 hours, with an additional two hours allowed for overtime.

Therefore, the maximum work shift allowed is ten hours per day. Most employees work spread out across many miles, making it often difficult to manage hours worked. Overtime is a point of contention between employees and the labor department, as employees would receive extra compensation for working overtime. However, the ten-hour workday is strictly enforced. Living areas such as dormitories, bathrooms, cafeterias and washrooms

must meet minimum standards having concrete floors, locker rooms to guard personal items and have separate trash collection areas. Safety equipment, referred to as EPI (Equipamento de Proteção Individual) must be made available to all employees working in “dangerous” or hazardous conditions. Additionally, a facility solely designated for the cleaning and storage of the EPI’s must be made available. (See checklist on page 20)

CONCLUSION

Brazil has always had a mystic allure about it. Travelers seeking a temporary retreat often find themselves seeking a more permanent haven. When the Portuguese royal family was forced to flee Lisbon to avoid persecution from Napoleon’s army, they relocated to Rio de Janeiro in 1808. When it came time for King João VI to return with his family back to Portugal in 1822, the parliament ordered his son, Pedro, to join him. In what is now taught in every Brazilian history class, Pedro gave a one word defiant reply, “Fico”, or “I am staying.” Like many who came after him, Pedro became a convert, finding contentment with the warm tropical climate.

While this paper may not satisfy all of the comprehensive issues involved, hopefully readers are able to walk away more informed, or at the very least, provide more stimulus for reflection. Important points that I took away from my research are:

- Virtually all farmers are taking part in at least some type of sustainability. The question remains to what degree.
- Sustainability is a process, and not simply about location.
- There is no silver bullet. Some sustainable practices take years to develop.
- The Brazilian government has passed legislation regarding the protection of its Amazon and Cerrado biome. The challenge is enforcing it and stopping those who seek illegal deforestation.
- Most of illegal deforestation is attributed to non-agriculture related industries.
- While we should not stop until illegal deforestation reaches zero, there is a clear downward trend. Brazil has established a clear goal of zero illegal deforestation by 2030.
- Farmers are some of the largest caretakers of environmental areas in Brazil.

Much has changed in the last several decades. The older generation of farmers who migrated from southern Brazil to the Central West region of Brazil were pioneers. Their objective was to figure out how to unlock their natural resources to feed a growing world. They did not have roads, hospitals or Internet. Despite this, it is because of their courage and determination that has led to impressive economic prosperity. The next generation has demonstrated a keen awareness in adopting a sustainable growth strategy that works in conjunction with continued economic development.

Brazil continues to grapple with its newfound role as a global leader in food production. The discussion regarding sustainability is still evolving as interested parties continue to lobby stakeholders to help define the limits of agriculture development and environmental preservation. My father often referred to the Cerrado as God’s secret miracle. For centuries the means to feed ourselves was available, we just lacked the technology on how to unlock it. Therefore, it is not just God’s miracle, but perhaps God’s test. We cannot afford to completely desecrate the Amazon or the Cerrado, but nor can we afford to stand idle, hoping God will step in to eliminate hunger.

Brazil has become nature’s own laboratory. A laboratory that if cultivated prudently, might sustain the human species for many generations to come. In the end our goal is the same. And that is to leave Brazil better off than we found it.

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Contributed Articles:

- Water Horita, Grupo Horita, O agro conserva a natureza no Brasil
- Beatriz Domeniconi, GTPS, Sustentabilidade: não acontece porque não sabemos o que é!!
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