

MATOPIBA: SUSTAINABILITY, DIVERSITY AND GENDER



GOOD
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GENDER PERSPECTIVES FOR SUSTAINABLE
PRODUCTION IN MATOPIBA

MATOPIBA: SUSTAINABILITY, DIVERSITY AND GENDER

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1st edition

This series of booklets “Gender perspectives for sustainable production in MATOPIBA” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the rural environment in Brazil even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF¹ -, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This introductory booklet discusses the topic **MATOPIBA: sustainability, diversity and gender**. The expansion of the agricultural frontier over the Cerrado brought soybean and a new production dynamic to the region. Now, there is a strong need (and effort) to introduce high levels of technology that prioritize productivity combined with good soil management and environmental preservation. What is the importance of sustainable development in MATOPIBA? What is the role that women play in agricultural enterprises? How are the lives of newcomers intertwined with traditional communities of the region? The expert Gisela Introvini shares insights and perspectives throughout this publication to answer these and other questions.

Happy reading!

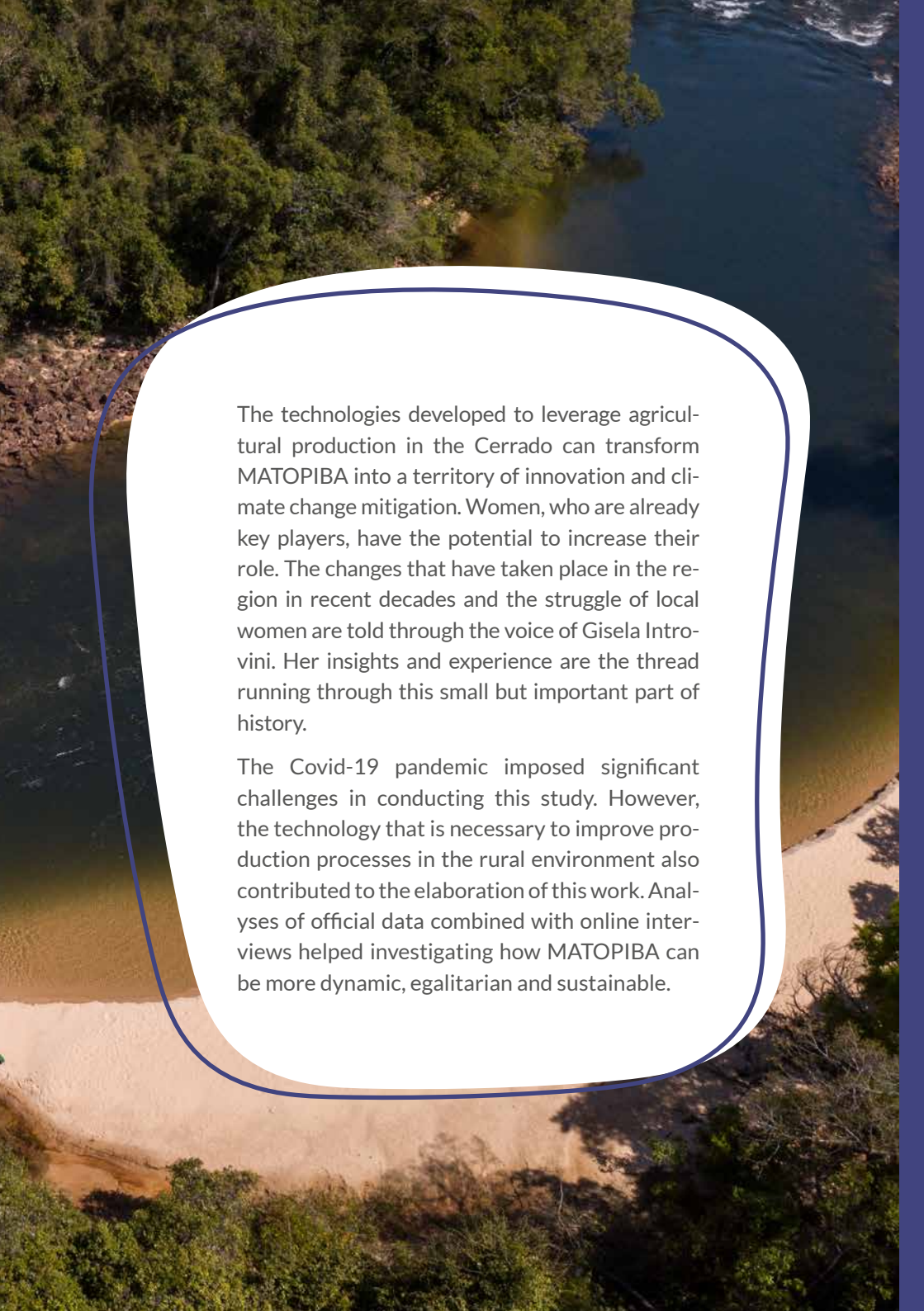
1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.



INTRODUCTION

This booklet explores, from a gender perspective, the economic and social dynamics necessary for the sustainable production of soy. Talking about this production is a great challenge for Brazilian agriculture. Based on the experience of a great expert, social, economic and environmental aspects associated with sustainable development are presented.

The role of different actors, in particular of women, in the MATOPIBA region is discussed. MATOPIBA is the region composed of the states of Maranhão, Tocantins, Piauí and Bahia. Increasing sustainability has become a commitment not only in the soy production chain, but also in all segments of society and the various spheres of government, even if this commitment manifests itself in different levels of engagement.



The technologies developed to leverage agricultural production in the Cerrado can transform MATOPIBA into a territory of innovation and climate change mitigation. Women, who are already key players, have the potential to increase their role. The changes that have taken place in the region in recent decades and the struggle of local women are told through the voice of Gisela Introvini. Her insights and experience are the thread running through this small but important part of history.

The Covid-19 pandemic imposed significant challenges in conducting this study. However, the technology that is necessary to improve production processes in the rural environment also contributed to the elaboration of this work. Analyses of official data combined with online interviews helped investigating how MATOPIBA can be more dynamic, egalitarian and sustainable.



GISELA INTROVINI

Born in the state of Paraná, Gisela is an agronomist who acquired extensive experience with rural cooperatives in her homeland. Her Post-graduate specialization in Seed Production motivated her to move to the state of Maranhão, where she has lived for over 25 years.

Since her arrival in Maranhão, she has been working at the “North Export Corridor Research Support Foundation ‘Irineu Alcides Bays’” (FAPCEN). Currently, Gisela is the superintendent of the institution. Parallel to her work at FAPCEN, she is the President of the Association of Women in Agro, Vice-President of the Round Table on Responsible Soy Association (RTRS), and Coordinator of Agrobalsas, the largest agribusiness event in the state of Maranhão.

MATOPIBA, A REGION OF OPPORTUNITIES

During the second half of the 1980s, the search for new arable land in Brazil brought the agricultural frontier to the area known today as MATOPIBA. The region, previously inhabited by family farmers and traditional communities, witnessed a major transformation in production systems. Currently, MATOPIBA is reference in soy, corn, cotton, and beef.

Table 1 - MATOPIBA: main agricultural products (2018)

Region	Soy (tons)	Corn (tons)	Cotton (tons)	Cattle (head of cattle)	Porcine herd (head of hogs)
Bahia*	6,309,147	2,058,883	1,240,673	1,790,462	160,476
Piauí*	2,428,464	1,300,420	24,265	437,699	56,325
Tocantins*	2,667,936	812,816	8,000	8,352,513	318,975
Maranhão*	2,606,906	1,185,992	91,654	5,497,791	737,420
MATOPIBA (II)	14,012,453	5,358,111	1,364,592	16,078,465	1,273,196
Brazil (I)	117,912,450	82,366,531	4,956,125	213,809,445	41,231,856
(II)/(I)	11.9%	6.5%	27.5%	7.5%	3.1%

Source: IBGE (2018).

*Only municipalities belonging to MATOPIBA were considered.

MATOPIBA has become a strategic region for Brazilian agribusiness. The area has become famous for its biodiversity² and sociocultural richness. The technology that increased productivity per hectare now promotes more sustainable agricultural practices. The new forms of cultivation, such as crop rotation and no-till farming, now foster the recovery of degraded areas.

2. According to the Society, Population and Nature Institute (ISPN), the Cerrado has 2,653 species of vertebrates and about 12,000 cataloged plants. The Cerrado is the most biodiverse savanna-type vegetation in the world (ISPN, 2021). Available at: <https://bit.ly/3kpGjRn>.

The technology that was brought to the region with the cultivation of soy has the potential to spread to other local activities as well. “Local communities learned, through this crop, how to make other family farming activities more productive. They see the adaptability of new cultivars, they participate in field days and diversify their crops. In this way, we are treating family agribusiness in the same way that we have treated big rural entrepreneurs; transferring information and innovative technologies to everyone”, says Gisela Introvini, Agronomist and FAPCEN Superintendent. She recalls the change she has witnessed in the region over the last 25 years. “We have incentives for the inclusion of people and training through courses in several municipalities that plant soybean”, Gisela affirms.

From rural development to sustainable development

“In order to move forward with the environmental issue, we have got to listen more to the research, we have got to listen more to the researchers on the issue of climate change.”

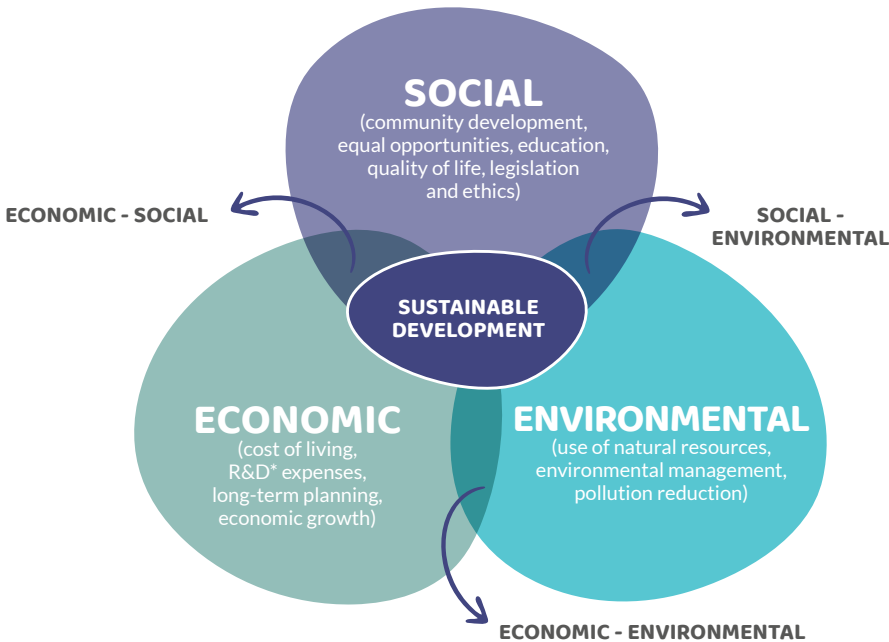
Gisela Introvini

Changes in production systems accompanied changes in the understanding of rural development. From the Green Revolution, in the 50's, to the present day, the concept of rural development has incorporated other approaches that started to think beyond food production and increased productivity. Food security continued to be important, but producing regions now have their social and environmental aspects valued as well. In this sense, thinking about pub-

lic policies for rural areas has become an even more complex challenge. Respecting the dynamics of the territory and promoting the well-being of the local population are as important as agriculture itself. This new paradigm is expressed in the three pillars of sustainable development - social, economic and environmental - and their respective combinations:

1. Economic-environmental: energy efficiency, subsidies and incentives for the use of natural resources;
2. Social-environmental: environmental justice, intergenerational equity, support to local communities;
3. Economic-social: labor rights, fair trade markets, business ethics.

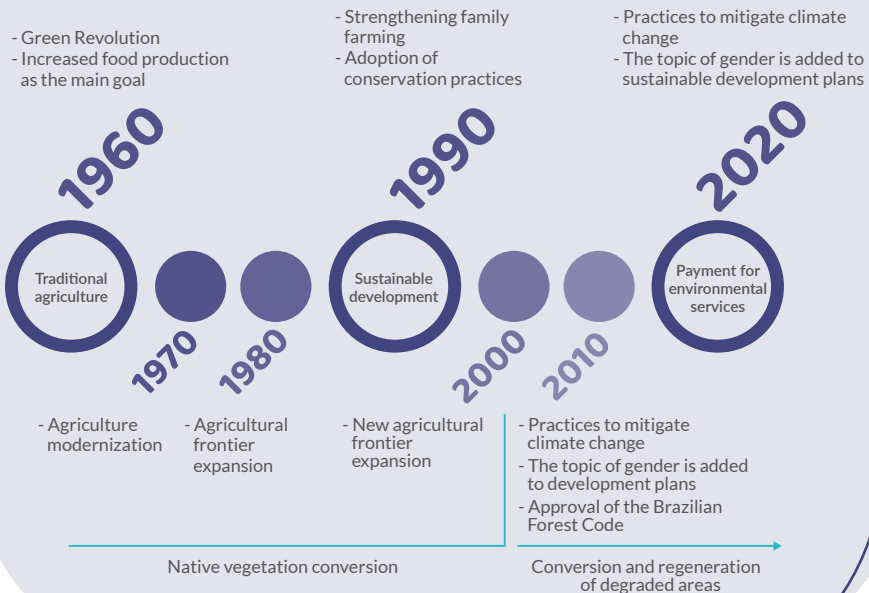
Figure 1 - Three pillars of sustainable development



* R&D-Research and Development

Did you know?

Between the 1960s and the present day, the concept of rural development incorporated new approaches that came as responses to the demands of the countryside. Producing food right after the end of World War II was the first call. Many regions faced periods of severe famine and needed to be attended to. From the 70s onwards, social issues became the protagonists. More recently, in the 1990s, the environmental agenda was incorporated, bringing the need to think of forms of production with less impact on ecosystems (to mitigate climate change at a global level). Brazil, as one of the world's leading producers of agricultural commodities and possessing large areas of native vegetation, has stood out in international debates. The country has proposed a new law for the protection of native vegetation (Forest Code) and regulated PES - Payments for Environmental Services (Booklet 9). The implementation of PES is subject to the effort of the federal government to carry out environmental regularization (Booklet 1) and the commitment of rural producers to manage the natural capital of their properties (Booklet 7)..



Source: Ellis and Biggs (2001). Adapted by ECONSULT.

SUSTAINABILITY AND GENDER: WHEN TWO INITIATIVES MEET

Gisela Introvini was emphatic in stating that women are usually more sensitive to environmental issues. This sensitivity can be observed in different stages of the production chain - whether in a more sustainable management, in the adoption of new technologies or in the commercialization of socio-bio-diversity products.

Gisela also highlights the role of women in decision-making when adding value to the production. Women participate in courses and trainings (many of which are offered by FAPCEN). They learn to value their own work and the work of other professionals in the rural properties.

"We observe that on rural properties certified by FAPCEN, many women stand out with a new perspective that translates into new values to the area where they are located."

Gisela Introvini



According to Introvini, having a property certified by FAPCEN improves the overall management of the property. The workers learn about their rights and duties and understand better the risks that any rural enterprise is subjected to. This knowledge is important so that the producers can avoid having "any agricultural liability caused by problems such as oil spills on the property or agrochemical packaging being exposed to the environment", Introvini adds.

The expert's experience, in this case, is fundamental as there is little data associating women's greater participation with the adoption of more sustainable activities. However, for good soil management practices, such as no-till farming, the reality is different.

No-till Farming, the great ally of a more sustainable production

"We work on the sustainable development of the soy produced here, to value the land, and to bring greater visibility of its traceability when the product is sold."

Gisela Introvini

No-till farming is a soil management technique that improves the chemical, physical and biological characteristics of the soil. The technique preserves soil moisture, prevents erosion, and contributes to the maintenance of soil biota. In this system, the planting of soy is done by directly placing seeds and fertilizers in the unturned soil and covering the seeds with plant residues from other crops (straw). In Brazil, no-till farming is widely used in soy crops, as it is easy to adapt and it is low cost. The no-till system³ also makes the soil perform better in carbon sequestration. There are 33.1 million hectares cultivated under no-till farming in Brazil⁴, 10% of which is in MATOPIBA.

2. Available at: <https://bit.ly/2XOiHOG>. Accessed: February 10, 2021.

3. IBGE (2019).



Table 2 - MATOPIBA: Total of properties and properties that deploy no-till farming (2017)

States*	Total of properties	Properties that deploy no-till farming	no-till farming rate within states (%)
Tocantins	63,647	2,306	3.6
Maranhão	146,592	11,271	7.7
Piauí	22,599	582	2.6
Bahia	56,588	2,404	4.2
MATOPIBA	289,426	16,563	5.7

Source: IBGE (2019).

*Only municipalities belonging to MATOPIBA were considered.

This system has gained strength in the last two decades. The expectations of the Brazilian Federation of the No-Till System are to maintain this growth in the coming years. With an increasingly strong environmental agenda, the adoption of systems such as no-till farming has become one of the most fundamental environmental preservation practices that influences access to some credit lines. Promoting sustainable initiatives through economic incentives is one of the ways to spread techniques such as no-till farming (Booklet 3).

Gender and education: disseminating good preservation practices

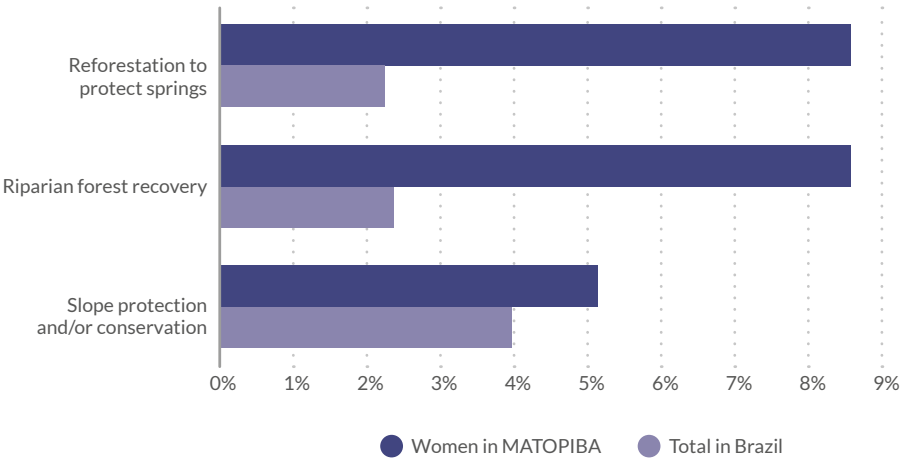
"The interweaving of forces unites us, mainly, in the search for sustainable development based on the soy produced here."

Gisela Introvini

Other agricultural practices can contribute to the sustainable development of a given region. As Gisela points out, knowledge is the main way to promote production with preservation. The MATOPIBA women can prove this through three practices.

The Agricultural Census shows that few Brazilian properties adopt reforestation to protect springs (2.2%), recovery of riparian forest (2.4%), and protection and/or conservation of slopes (4%). However, when only postgraduate female rural producers are taken into consideration, the difference is significant, and the numbers mentioned above almost double⁵.

Figure 2 - Type of agricultural practice: in Brazil and among postgraduate women* in MATOPIBA (2017)



Source: IBGE (2019).

* Female rural producers with a master's or doctorate degree.

The adoption of good agricultural practices has the potential to reduce carbon emissions and preserve native vegetation. Expanding the agricultural frontier into new areas are “decisions that can happen, but that will come over time. I believe that there is no point in promoting the opening of areas if this expansion can lead to climate problems later on”, Gisela reflects. As the expert highlights, knowledge is important to promote good soil management

5. Similar results are also observed among postgraduate men.

practices in addition to helping understand how decisions taken today can affect MATOPIBA in the long term. What rural producers need is training, the learning of new techniques and the exchange of experiences. Because knowledge is an asset that accumulates, education is the best investment in the present to reap benefits in the future.

WE, WOMEN, LEADERS OF MATOPIBA

The territory that constitutes the current MATOPIBA is rich not only in biodiversity, but also in cultures and traditions. Women are part of this treasure trove. Major changes in favor of gender equity should take place precisely within the properties. Between 2006 and 2017, the number of properties run by women increased 18.1%, bringing the region closer to the national average of 18.9%⁶.

Table 3 - MATOPIBA: Total number of rural properties, rural properties run by women and percentage of female managers

Region	Total of properties	Properties run by women	Properties run by women (%)
Tocantins	63,647	10,347	16.3
Maranhão	146,592	27,795	19.0
Piauí	22,599	3,666	16.2
Bahia	56,588	10,518	18.6
MATOPIBA	289,426	52,326	18.1

Source: IBGE (2019)

However, significant differences are found among the MATOPIBA states. Maranhão led the ranking, with 19.0%. The states of Piauí (16.2%) and Tocantins (16.3%) come last. According to Gisela Introvini, there is a strong movement of

6. IBGE (2019).

women entering strategic positions in different stages of the production chain. Gisela notices the changes that have taken place in the region since she arrived in 1998, and today she proudly presents the involvement of women in decision-making, and their increasing participation in leadership positions. Yet, she recognizes that most women still lack support of some kind.

Figure 3 - MATOPIBA: Profile of female leaders (2017)



Source: IBGE (2019).

*Mini properties are properties with less than 10 hectares. Small properties have between 11 and 200 hectares (Alcântara Filho and Fontes, 2009).

Despite all difficulties, women of MATOPIBA have shown to be active and resilient. It is no coincidence that institutions such as the Organization for Economic Cooperation and Development (OECD) and the United Nations (UN) recognize women as an important multiplier of public policies. In addition to the great potential coming from formal education and technical training, women are also very receptive to acquiring new knowledge. Their contribution, with no doubt, goes beyond their responsibilities within the properties. They commonly represent the bond that unites their communities, which turns out to be an important strategy to face the new challenges that are ahead.

GGP and female leaders

The Good Growth Partnership (GGP) project operates in ten municipalities in MATOPIBA, five in the state of Tocantins and five in Bahia. Located in strategic soy production regions, these municipalities bring an interesting fact about female leaders. In them, the participation of women as managers of agricultural establishments is 20.8% – above the MATOPIBA average of 18.1%, and above the national average of 18.9%. The standouts are São Desidério, Barreiras and Palmas.

Table 4 - MATOPIBA: agricultural establishments run by women in selected municipalities (2017)

Municipalities	Total	Run by women	Run by women (%)
1. Monte do Carmo (TO)	831	109	13.1
2. Porto Nacional (TO)	1,724	350	20.3
3. Santa Rosa do Tocantins (TO)	540	66	12.2
4. Silvanópolis (TO)	366	48	13.1
5. Palmas (TO)	1,229	285	23.2
6. Barreiras (BA)	2,171	520	24.0
7. Formosa do Rio Preto (BA)	1,344	232	17.3
8. Luís Eduardo Magalhães (BA)	415	76	18.3
9. Riachão das Neves (BA)	1,625	297	18.3
10. São Desidério (BA)	2,284	626	27.4
Total	12,529	2,609	20.8

Source: IBGE (2019).

Gisela points out that migrants, who arrived in the region in the 1980s, brought their entire families and that women from these families are also central elements in decision-making within the property. Unfortunately, the women involvement observed by Gisela “behind the scenes” is not fully comprehended by the Agricultural Census, especially when it comes to soy production.

In the specific case of soybean, what happened was that women entered into a world that was until then predominantly male-dominated. The fact that women lead 8.3% of agricultural establishments that produce soybean in MATOPIBA is already a great victory. Participation is small, but it has inspired new generations to show that women can be whatever they want, including rural property managers.

Table 5 - MATOPIBA: total of agricultural establishments that produce soy and establishments run by women (2017)

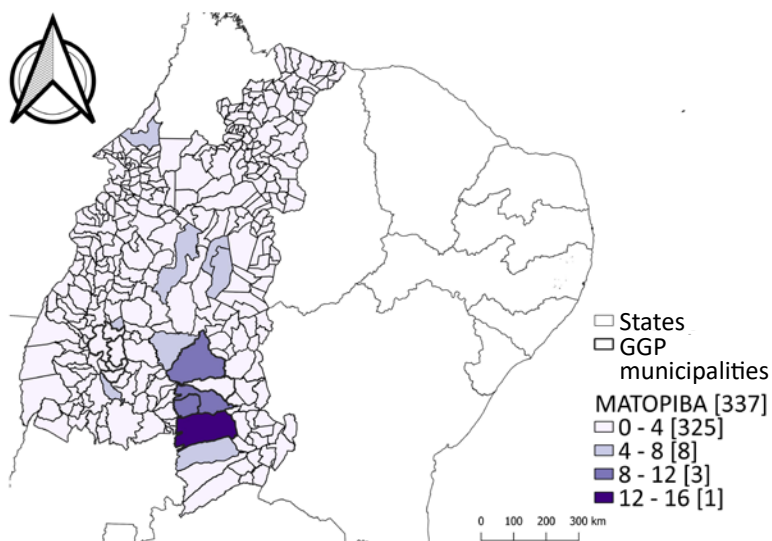
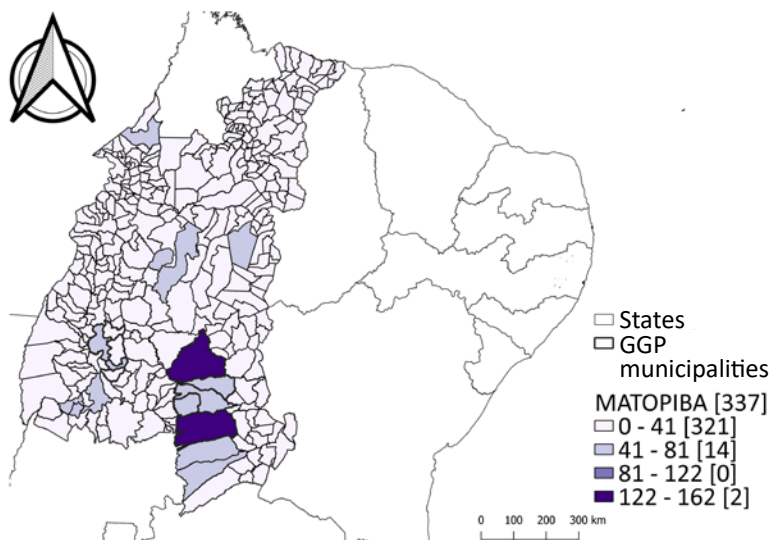
Region	Total of establishments	Establishments run by women	Establishments run by women (%)
Tocantins	977	65	6.7
Maranhão	399	39	9.8
Piauí	216	22	10.2
Bahia	635	59	9.3
MATOPIBA	2,227	185	8.3

Source: IBGE (2019).

The female farm leaders are located predominantly in the states of Tocantins and Bahia – not by chance, where the main actions of the GGP project are carried out.

Figure 4 - MATOPIBA: Agricultural establishments that produce soy and establishments run by women (2017)

The municipalities of the Good Growth Partnership (GGP) project are highlighted



Source: IBGE (2019).

There are several factors that contribute to the concentration of a crop in a particular region. Some of them are climate, soil, relief and appropriate technology. All four directly affect productivity per hectare. Gisela affirms that women are more open to experimenting and implementing new sustainable management techniques. Women themselves inspired this series of Booklets to bring two topics – the responsible expansion of soy (Booklet 5) and the sustainable intensification of the livestock chain (Booklet 6) –, covering two of MATOPIBA's main agricultural products.

MATOPIBA also has some pilot projects for the adoption of integrated systems and crop succession strategies. The ABC Sustainable Soy project, a partnership between Conservation International and Embrapa⁷, is an example. Such initiatives help promote better forms of land use and define the appropriate crops to be cultivated with soy. The sensitivity of women stands out again. In Booklet 2, the experts talk openly about the importance of the Low Carbon Emission Agriculture (ABC) plan - which was recently restructured and renamed the ABC+ plan, valid for the next decade (2021/2030).

It is as an owner that I have the opportunity to be the manager

“We offer courses and training so that women can technically compete on an equal footing with men.”

Gisela Introvini

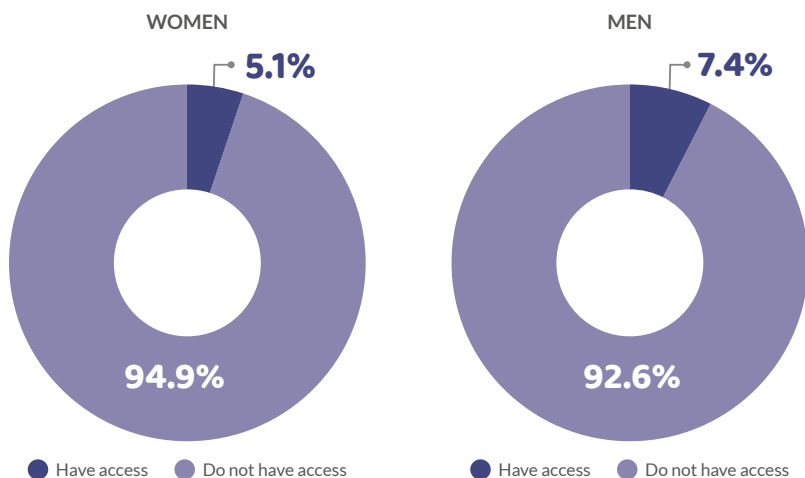
In MATOPIBA, most properties are managed by their actual owners. About 72% of women and 75% of men assume the management of their establishments, which shows that most of this population has farming as their main (or second-

7. Translator's note: EMBRAPA stands for “Empresa Brasileira de Pesquisa Agropecuária”. A suitable translation would be “Brazilian Agricultural Research Corporation”.

ary) activity. At first glance, this number seems balanced. However, when the question becomes “who will work as a manager on my property”, a decision that 28% of women and 25% of men need to make, the participation of women as managers drops to 4.4%. In other words, if not on her property, a woman almost never gets the chance to take over the general management of an establishment. This shows the importance of the link between women and their territory. It also suggests that having (or not having) ownership of the land can be a determining factor for women to stay in the countryside, especially in the case of women whose occupations are more directly linked to the management of the land.

Several decisions are made based on available technology (Booklet 4, Technological innovations). Technical Assistance and Rural Extension (ATER⁸) provides fundamental support in this front. Although ATER is present in all Brazilian states, and the rural extension service is offered in some states by private institutions, most Brazilian producers - women or men - do not regularly access technical guidance. MATOPIBA follows the national trend.

Figure 5 - MATOPIBA: access to technical guidance in agricultural establishments (2017)



Source: IBGE (2019).

8. Translator's note: "Technical Assistance and Rural Extension" services are referred as ATER in Brazil. Through these services, public and private institutions provide producers with trainings, field excursions and even equipment and inputs. "Rural Extension" could be translated to "Rural Outreach".

The impacts of this restricted access can be seen in the acquisition of farm inputs – what to buy, how to use it, how to optimize –, in the management of natural resources within the property and in choosing of best cultivars. The consequences appear again in the establishment's productivity, which in turn affects the decision of family members to remain on the property or to seek employment in other activities.

The Federal Government, through the Ministry of Agriculture, Livestock and Supply (MAPA) launched in October 2020 the ATER Digital⁹ program. This program aims to strengthen and expand ATER through the adoption of Information and Communication Technologies (ICTs) in the institution's actions. Initiatives like this are very welcome, especially for small and medium-sized properties, such as those in MATOPIBA.⁸

DIFFERENT PEOPLE, MANY CULTURES

Although MATOPIBA is known for its agricultural activities, numerous traditional communities inhabit the region. Gisela says that support for these communities must go hand in hand with the region's development. In the specific case of soy, she emphasizes that the commitment of properties certified by the RTRS¹⁰ goes beyond the rules established by the association.⁹

"In my understanding, every certified property must be linked to social work in the surrounding communities. This rapport has been happening and it is contributing to territorial valuation, minimizing the great social differences that still exist in these regions."

Gisela Introvini



9. Available at: <https://bit.ly/38nlmO>.

10. Round Table on Responsible Soy Association (RTRS), which continues to grow in the main soy producing countries.

What do statistics say about traditional communities?

There is still no precise number of how many traditional peoples and communities live in Brazil. However, initiatives from the NGOs Amazon Environmental Research Institute (IPAM) and the Society, Population and Nature Institute (ISPNI) have contributed a lot to the documentation of traditional groups. "Built based on the dialogue with residents and associations of rural areas in the Cerrado, the "Tô no Mapa" app allows traditional communities and family farmers from all over Brazil to self-map their territories", states IPAM. Despite its national scope, the app was originally created to address the lack of official data in an area of around 32 million hectares in the Cerrado. The engagement of the two NGOs paid off. So far, 2,398 communities have been identified in 168 municipalities – only 24 of them outside the states of Maranhão, Tocantins, Piauí and Bahia.



Source: IPAM and ISPNI.

Note: Image identical to the original (in Portuguese).



Quilombolas, active voices from the Cerrado

"Through the meetings that FAPCEN organizes, we seek to connect women who work in agriculture with women from traditional communities, who have been in the region for longer."

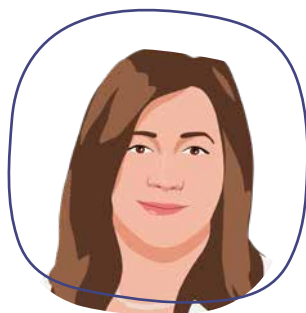
Gisela Introvini

The concession of indigenous lands and the titling of Quilombola communities are ways of honoring the identity of these traditional peoples. 11.0% of all establishments in indigenous lands in Brazil were located in the territory of MATOPIBA. For the Quilombolas, the number is even greater (33.7%). In these communities, the presence of women in leadership positions reaches 26.2% - far above both the MATOPIBA average (18.1%) and the Brazilian national average (18.9%).

Women's voices contribute to decision-making in different spheres, but, according to Gisela, all traditional peoples and communities, including family farmers, are important for the sustainable development of the region.

"There is a whole process of honoring their origins and recognizing their identity for these women, which was not always like this. When I arrived here, those who belonged to a Quilombola community were ashamed to say they belonged to the community. Today they speak with pride about this."

Gisela Introvini



Talking about territorial public policies is also talking about public policies for traditional peoples and communities. Gisela highlights the importance of praising the territory, and promoting the integration of livestock and grain production with tourism. Her proposal is to foster opportunities to reduce social differences that still exist. "These small communities will never plant soybean, they want to live in the forest, in the environment in which they are located". The series "Gender perspectives for sustainable production in MATOPIBA" discusses the relevance of traditional peoples to MATOPIBA in Booklet 8.

GENDER EQUALITY, A CROSS-CUTTING AGENDA

The topic of gender is essentially transversal, for it is present in all spheres of social, economic and political life. For many years, national and foreign institutions for the promotion of development have incorporated the gender issues into their agendas. That has been essential to build a culture of gender equity in all places and sectors of the economy, including agriculture.

Having gender policies together with MATOPIBA's sustainable development is fundamental. After all, soy "brought an awakening" but, as Gisela states, "now we need to clean up the house, we need a strong (re)arrangement in this territory". In fact, soy arrived in the region bringing rapid transformation and many challenges.

"We are the migrants, who transformed plains considered poor and unproductive. If we are living well, it is because this is a land of opportunity for everyone. Of course, we must balance it out. The partnership between agribusiness and communities does not have to have any associated burden.

The only "price to be paid" comes from the certification work, it comes from the HDI pact that we are conducting through the coordination from FAPCEN."



Gisela Introvini

Dialogue with locals is an opportunity to value their best and to protect native vegetation. It is with pride in the achievements accomplished so far and with confidence in the next steps to come, that Gisela invites everyone to read the series "Gender perspectives for sustainable production in MATOPIBA".

"My mission in this territory is to break paradigms."

Gisela Introvini

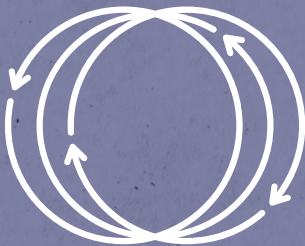
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GOOD GROWTH PARTNERSHIP





ENVIRONMENTAL REGULARIZATION OF RURAL PROPERTIES

Implementation of the Forest Code and its importance
for the sustainability of agricultural production



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GENDER PERSPECTIVES FOR SUSTAINABLE
PRODUCTION IN MATOPIBA

ENVIRONMENTAL REGULARIZATION OF RURAL PROPERTIES

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for the sustainability of agricultural production

Brasília/DF, 2021

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TRANSLATION

Matheus Sanitá Lima

1st edition

This series of booklets “Gender perspectives for sustainable production in MATOPIBA” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the rural environment in Brazil even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF¹ -, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This booklet brings the topic **Environmental Regularization of Rural Properties: Implementation of the Forest Code and its importance for the sustainability of agricultural production**. What is the Rural Environmental Registry? What are the environmental regulation programs? What are the characteristics of MATOPIBA? How does the gender element fit into the dynamics of environmental regularization in Brazil? What are the opportunities and challenges for women in the countryside? Throughout this publication, the experts Janaina Rocha, Daiane Maria Pires e Silva, Mara Angélica dos Santos and Maria Daniela Martins Guimarães share their perspectives.

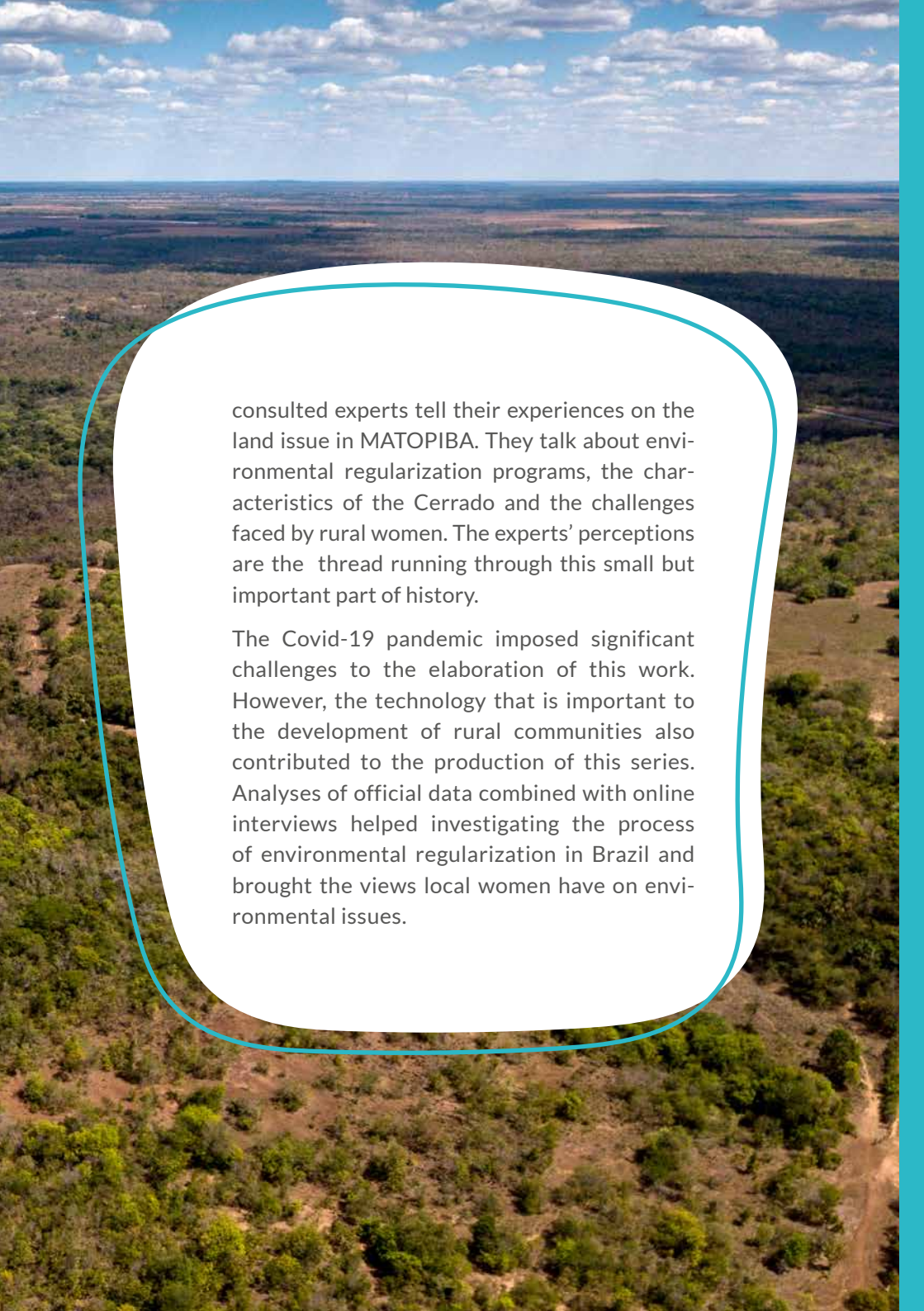
Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.



INTRODUCTION

This booklet reports on the dynamics of environmental regularization in Brazil based on the new Forest Code. The national Rural Environmental Registry (CAR) is discussed along with the State Forestry Registry of Rural Properties (CEFIR). CEFIR is implemented by Bahia's state agency for environmental regularization - the Institute for the Environment and Water Resources (INE-MA). In MATOPIBA - an acronym created from the initials of the respective component states MARanhão, TOcantins, Plauí and BAHia - CAR contributes not only to environmental planning, but also plays an important role in land title regularization, even though it does not legally serve this purpose. Throughout the booklet, the



consulted experts tell their experiences on the land issue in MATOPIBA. They talk about environmental regularization programs, the characteristics of the Cerrado and the challenges faced by rural women. The experts' perceptions are the thread running through this small but important part of history.

The Covid-19 pandemic imposed significant challenges to the elaboration of this work. However, the technology that is important to the development of rural communities also contributed to the production of this series. Analyses of official data combined with online interviews helped investigating the process of environmental regularization in Brazil and brought the views local women have on environmental issues.

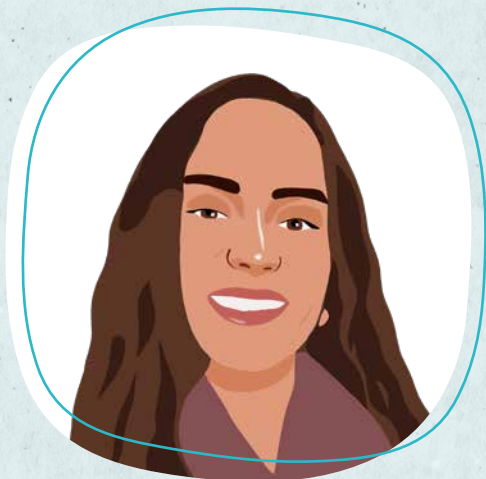
DAIANE MARIA PIRES E SILVA



A Forestry Engineer from the Federal University of Sergipe (UFS), Daiane has a specialization in Environmental Education from the Higher Institute of Education Afonso Cláudio (Iseac) and a master's degree in Ecology Applied to Environmental Management from the Federal University of Bahia (UFBA). She has always worked with forestry and environmental issues. She currently focuses on forest restoration and environmental regularization with traditional communities and family farmers. Her projects are under the Biodiversity Management Coordination, a focus group in the Sustainability and Conservation Directorate of the Institute for the Environment and Water Resources (INEMA). INEMA is an environmental agency of the State of Bahia.

A Forestry Engineer from the University of Brasília (UnB), Janaina holds a master's degree in Tropical Forest Science from the National Institute of Amazonian Research (INPA). She is a specialist in Information Systems for Biodiversity by the Japan International Cooperation Agency (JICA). Since 2010, she has participated in the elaboration of the National Rural Environmental Registry System (SICAR), having acted as executive manager during the implementation of this system in the country. She has worked with the Amazonas State Government and the Brazilian Forest Service (SFB)

JANAÍNA ROCHA



MARA ANGÉLICA DOS SANTOS

A Forestry Engineer from the Federal University of Sergipe (UFS), Mara holds a specialization in Occupational Safety Engineering and Environmental Management from Tiradentes University (Unit). She built her career at the Bahia Institute for the Environment and Water Resources (INEMA). At INEMA, she occupies the position of Biodiversity Management Coordinator, assisting small, Indigenous and Quilombola producers in restoring conservation.



MARIA DANIELA MARTINS GUIMARÃES

A Biologist, Maria holds a master's degree in Teaching, Philosophy and History of Science from the Federal University of Bahia (UFBA). She is a specialist in Environment and Water Resources, and a technical advisor to the general board of the Bahia Institute for the Environment and Water Resources (INEMA). She has been working with environmental regularization of rural properties for eight years. Daniela is also active on the teaching of Biology and Ecology, focusing on themes such as the current environmental crisis and the systemic view of planet Earth. She also fosters collaborations between school teachers and researchers in the field of Science Education.



RURAL ENVIRONMENTAL REGISTRY (CAR): WHAT IT IS AND WHY IT IS IMPORTANT

Created together with the new Forest Code (CF)², the Rural Environmental Registry (CAR) is a fundamental requisite for the environmental regularization of any property. CAR simplified a process that, until then, was notarial and bureaucratic. While the former CF³ required the presentation of technical analyses by a real estate registrar, CAR is a self-declaring electronic public registry with national validity. Mandatory for all rural properties, it aims to integrate environmental data such as the status of Permanent Preservation Areas (APP), Legal Reserve areas (RL), forests and remnants of native vegetation, Restricted Use Areas (AUR) and consolidated areas. CAR forms a database for monitoring, combating deforestation, and environmental and economic planning⁴.

One of the main objectives of the new Forest Code was to solve environmental liabilities, that is, to regularize rural properties that were found to be contrary to the law. Programs and tools were created to better articulate the procedures for environmental regularization. CAR then became the mechanism chosen as the most effective in managing and monitoring the recovery of irregular properties. Regularization of the registry may support policies, programs and projects for environmental and economic planning and combating illegal deforestation. Although CAR is still in progress, the prospects are good. The 6.1 million registered properties indicate the general public welcomed this new tool⁵. In addition, CAR has proven to be a more practical and safer control and management mechanism than the notary system⁶.

Janaína Rocha highlights that CAR is a central element for sustainable rural planning, despite the challenges encountered so far. “The tool was created for this, to support this planning and fight illegal deforestation, but what we

2. Law number 12,651 of May 25, 2012.

3. Law number 4,711 of September 15, 1965.

4. Savian et al. (2014); D'avila (2015).

5. Data available by the federal government through the National Rural Environmental Registry System (SICAR), last updated on February 8, 2021.

6. Barroso and Alencar (2014).

have as a background is exactly this dynamic of land use in Brazil”, explains the researcher. She recalls the land issues and environmental factors unraveled through the implementation of CAR – among them, the overlapping of rural properties onto territories of traditional peoples. “CAR is a thermometer. If you are sick, you are feverish. The thermometer does not cure the fever. It will detect whether there is a fever and whether or not you need to be medicated”, ponders Rocha.

In order to carry out with CAR, owners or holders of rural properties need to register in an online system available by state or municipal agencies. The agencies then receive and analyze the pertinent information, approving or not the CAR request. Once approved, the registration will be transmitted to a national database. This transmission can occur in two ways: either directly to the system provided by the Federal Government (the SICAR), or via data synchronization from a system developed by Local Governments.

The main technology that guides the registration in the CAR is the “geospatialization”⁷ of the property. Information collected in the field is compared with high-resolution satellite images and cartographic databases made available by the Government. Since 2006, the State Forestry Registry of Rural Properties (CEFIR) has been in the law, but it was only implemented via a computer system in the state of Bahia in 2012. Beyond being an environmental registration system, CEFIR prevents the overlapping of rural properties, immediately blocking registration of suspicious entries. “CEFIR asks for much more information than CAR. We ask what activities are carried out in the rural property that are subject to licensing. We investigate the use of water and the use of pesticides, for instance. The registration of the Legal Reserve was mandatory from the beginning, which did not happen with CAR”, reports Maria Daniela Martins Guimarães, from the Institute for the Environment and Water Resources of the State of Bahia (INEMA).

In the case of Bahia, when a problem of overlapping properties is identified, those responsible are requested to present the documents of ownership. Once there is more than one document of possession or ownership for the same area, which configures a possible land conflict, INEMA calls on those involved to resolve the

7. Translator's note: “Geospatialization” is the process of determining the physical limits of a property using geospatial technologies.

situation amicably or judicially. Despite the costs and the delay involved in this process, Maria explains that this checking has ensured that the interested parties themselves find solutions to their potential conflicts. “What we see is that this checking point in the system, most of the time, makes those involved adjust. We have a database of registrations today that is incredible. We are very proud of it, because there are no overlapping entries”, explains Guimarães.

At the national level, despite the challenges still present in and around CAR, Janaína emphasizes that the tool is crucial for sustainable planning of rural activities. “Even if there are overlapping entries, it is easier to resolve than if there are no records. Before CAR, many areas did not have any registered CPF⁸, so it could be the CPF of any Brazilian or even foreigners. Today, when there is an overlap, we have fewer records to search for and go after”, the researcher highlights. “Is it perfect? It is not perfect, but it is implemented and it is the result of nearly two decades of discussion in the legislative house”, the researcher affirms.

8. Translator's note: CPF literally translates to “Physical Person Registry”. That is Brazil's individual registration system mostly used for financial and fiscal operations.



CAR'S BENEFITS⁹

1. Dispensation from the Legal Reserve registration at the Real Estate Registry Office;
2. Access to the Environmental Conservation Support and Incentive Program and to Environmental Regularization Programs (PRAs);
3. Possibility of obtaining agricultural credit, in all its modalities, with lower interest rates, as well as limits and terms that are longer than those practiced in the market. Starting in December 2017, CAR became a prerequisite to access credit;
4. Access to agricultural insurance under better conditions than those practiced in the market;
5. Generation of tax credits through the deduction of Permanent Preservation Areas, Legal Reserve and Restricted Use Areas from the calculation of the Tax on Rural Territorial Property (ITR);
6. Access to funding for voluntary initiatives of preservation of native vegetation, protection of endangered native species, sustainable forestry and agroforestry management carried out on the property, or recovery of degraded areas;
7. Exemption from taxes on inputs and equipment, such as wire, treated wood poles, water pumps and soil drilling equipment used for the recovery and maintenance of Permanent Preservation Areas, Legal Reserve and Restricted Use areas;
8. Suspension of sanctions and fines from the irregular removal of vegetation (committed until July 22nd, 2008) in areas of Permanent Preservation Areas, Legal Reserve and Restricted Use Areas;
9. For those who joined the Environmental Regularization Program until December 31st, 2020, suspension of the punishment of crimes provided for in Articles 38, 39 and 48 of the Environmental Crimes Law (Law No. 9.651/1998);
10. Access to Payment for Environmental Services (PSA) programs.

9. Available at: <https://www.car.gov.br/#/sobre?page=regAmbiental>.

DISADVANTAGES OF NOT HAVING CAR¹⁰

1. Ban on aquaculture and associated infrastructure in rural properties with up to 15 rural modules, located in Permanent Preservation Areas;
2. Ban on the suppression of forest or other forms of native vegetation in the rural property;
3. Non-approval of the location of the Legal Reserve Area;
4. Permanent Preservation Areas are no longer addable in the calculation of the property's Legal Reserve;
5. Ban on the economic exploitation (through sustainable management) of the Legal Reserve;
6. Interruption of environmental easements, Environmental Reserve Quota and Legal Reserve compensation mechanisms;
7. Ban on interventions and removal of vegetation (for activities with low environmental impact) in Permanent Preservation Areas and Legal Reserve;
8. Ban on continuing agroforestry, ecotourism and rural tourism in Permanent Preservation Areas and Legal Reserve consolidated until July 22nd, 2008¹¹.

10. Available at: <https://www.car.gov.br/#/sobre?page=regAmbiental>

11. In the state of Bahia, where three of the consulted experts work, any request for licensing at INEMA (such as environmental licenses, grant to the right to use water resources, etc) is banned.



ENVIRONMENTAL REGULARIZATION PROGRAMS

Environmental Regularization Programs (PRA) comprise a set of actions to be developed by rural landowners or possessors with the goal of promoting the environmental regularization of their rural properties. This includes when there is an environmental liability from the irregular removal of remnants of native vegetation in Permanent Preservation Areas, Legal Reserves and Restricted Use Areas. This type of infraction must have happened until July 22nd, 2008^{12, 8}

Regularization can be carried out through recovery, restoration, regeneration or forest compensation. Once regularized, applicable sanctions can be suspended and the property has ensured the continuity of agricultural and livestock production, ecotourism or rural tourism. The restoration of marginal

12. Available at: <https://www.car.gov.br/#/sobre?page=regAmbiental>.

strips of Permanent Preservation Areas to a lesser extent than required by the general Forest Code is also possible, depending on the size of the rural property. For this, the producer must apply for PRAs when registering in the CAR¹³.

Figure 1 - Stages of CAR and environmental regularization



Source: Brazilian Forest Service (SFB), 2021
Elaboration: EConSult.

Of the more than 6 million records in the CAR today, 55.5% applied to PRAs. This number shows the dimension of the environmental liability existing in the country. These applications only occur when there are, in fact, environmental pendencies. In states such as Mato Grosso and Espírito Santo, 100% of producers registered in the CAR applied to PRAs. Although the government has not been able to determine the total area with environmental irregularities in Brazil, the large number of PRA applications shows a commitment by producers to environmental adequacy¹⁴.

13. Applications to PRAs were possible only until December 31, 2020.

14. Walendorff (2021).

“Brazil is still one of the countries that deforests the most, but it is also one of the countries that has the most conserved forests. CAR is an opportunity for us to demonstrate that more than half of the country’s forest area is in rural properties”, defends Janaína Rocha. In the case of Bahia, the state’s environmental and rural registration system goes further and requires the submission of a regularization plan upon registration. “If it is declared that the property has (within it) degraded Permanent Preservation Area, degraded Legal Reserve or other degraded areas, the producer must adhere to PRAs. The applicant must present the environmental recovery plan at the time of registration, otherwise the process will not be finalized”, reports Maria Daniela Martins Guimarães.

MATOPIBA: THE LAST AGRICULTURAL FRONTIER

At the center of the debate on environmental preservation in Brazil, MATOPIBA is considered a “treasure” for research and for the advancement of sustainable rural production. According to Janaína Rocha, “MATOPIBA is the last frontier of a very important biome [Cerrado]. Cerrado gives hands or arms to all the other biomes that exist in our country and it is in MATOPIBA that they meet. In fact, the region is the very center of Brazilian biodiversity. It is where one can see the transition happening in the different ecotones [ecosystem transitional areas] that exist in Brazil, and it is a very important place”, explains the forestry engineer.

Because of these characteristics, combined with favorable logistical conditions, the MATOPIBA is also the stage for a silent dispute between large producers and traditional peoples who live off the local biodiversity. Among them are not only the Indigenous people, but also the “Geraizeiros”¹⁵, the evergreen pickers, the mangaba healers, the babassu coconut breakers, and others who guarantee a vast cultural wealth formed by native people who have always occupied the territories that make up MATOPIBA.

15. Translator’s note: “Geraizeiros” are traditional inhabitants of a region in the Cerrado called “Gerais”. They live off subsistence activities that range from family farming to collecting fruits, roots, medicinal herbs and wild honey from the surrounding biome.

On the other hand, there is industrial agriculture, mostly made up of monocultures. “The view of the farmer who has a monoculture-based production is another. The property is a source of income, and the adoption of technology is based on domestic and international demands. As we know, the rural producer [small or large] does not profit with every harvest. Therefore, the connection with the land is different. Not making a value judgment, but they are different views of property and territory”, points out Daiane Maria Pires e Silva, server of the Biodiversity Management Coordination at INEMA. In her opinion, the region is experiencing a territorial conflict.

“It often happens that these communities, these small farmers, do not have documentation and many end up leaving their rural properties or selling them at very cheap prices and going to the city. So, the conflict exists within the expansion of soy cultivation in the region”, assesses the forestry engineer. She emphasizes the differences between the two forms of land exploitation. While one uses the native forest to guarantee subsistence, the other depends on the reduction of native vegetation to expand, even within the conditions allowed by the Forest Code.

“We are optimistic with the progress of registering these rural properties as a way of preserving native vegetation. If intact areas are reduced, there will also be an impact on the lives and work of people who survive from extractive activities, collecting seeds and fruits. Therefore, we will continue to fight for a middle ground in this story, as the modes of production, division of territory and land use are different”, concludes Daiane.

“MATOPIBA has the opportunity to show the world that it is possible to do differently. It is possible to use the latest, most innovative, state-of-the-art technology, and to demonstrate that there can be sustainable production. The expansion of the last agricultural frontier in the Cerrado finds legislation that already has well-defined rules. The rules are in place, they are there, this is an advance”, adds Rocha.



CHARACTERISTICS OF THE CERRADO MAKE THE FIGHT AGAINST DEFORESTATION DIFFICULT

Characterized by sparse undergrowth, the Cerrado is the second biome that suffers most deforestation in the country after only the Amazon. That is largely because of the false idea that there is no vegetation in the Cerrado. “Even today, the rest of the world is much more sensitive to the Amazon than to the Cerrado. The biome was once called Lavrado¹⁶, and this name is not by chance. It is an area prepared in our own legislation to have more converted areas than, for example, the Amazon”, explains Janaina. The Forest Code itself provides 20% Legal Reserve in MATOPIBA and 35% in other regions.¹²

“By infra legal regulations, in some regions we still have 50% of Legal Reserve as an obligation. So, it is not Federal Law that provides for a larger conservation area. This puts us in an environment in which the vegetation is still there in large part, but it suffered a lot of deforestation pressure in the last decade, as the region is the frontier of agribusiness expansion”, points out the forestry engineer. Janaina highlights the difficulties of the public authorities in monitoring the region. “We know the Cerrado has areas in which the public programs for monitoring deforestation have a much harder time to detect degraded areas. This happens even when looking at satellite images and using automatic detection sensors. The Pantanal also has this characteristic”, the researcher observes.

It is wrong, however, to associate the lesser protection and the natural characteristics of the Cerrado with a lesser environmental importance. The second largest biome in the country, the region is responsible for connecting all the other biomes – which explains its immense biodiversity. “The location of the Cerrado in relation to the Andes, in relation to the currents, makes it an environment that could be a desert. But in fact, it is super rich and super diverse, precisely because of this constellation of factors that are around this biome”, recalls Janaina.

16. Translator’s note: “Lavrado” could be translated to the adjectives “wrought” or “inwrought”. The idea is that this region was meant to be worked on and altered for agricultural production, given its natural characteristics (wide plains with sparse and easy to remove vegetation).

Rural exodus

The expansion of monocultures in the Cerrado, while providing development in some regions, increases the rural exodus of small farmers and traditional communities. INEMA's Biodiversity Management Coordinator is a witness to this process. "In some communities of Indigenous peoples and small producers, we witness cases in which young people end up leaving the rural area, moving to urban centers, often to São Paulo", reports Mara Angélica.

The result of this process, she explains, has been the increase in the average age of local producers and the abandonment of traditional activities. "It so happens that the older ones remain in rural properties, while the others leave the land. In this context, we find that those who stay do not maintain the traditional activities of the region. They end up opting for monocultures, just so they have a chance to enter the market", says the INEMA coordinator, highlighting that other agroecological activities, such as the production of seedlings, could provide greater conservation of the biome.

The return of young people who went to the cities is also a factor of local transformation. When this happens, Mara notices that there is a change in the vision of the role of women in the countryside (because of the contact with the reality of the city). "What we are seeing in some locations is the return of people who went to São Paulo, went to Goiás and now they are returning to their home territories. In this return, there is already a sign of change around the vision of the role of women in the management of rural properties", explains Mara.





OPPORTUNITIES AND CHALLENGES FOR WOMEN IN THE COUNTRYSIDE

Connected with activities of preservation and sustainable exploitation of the Cerrado, such as seed collection and the production of native seedlings, women still face strong prejudice and resistance to assume leadership roles in the region. Despite being the owners of a large part of family properties – a result of incentive programs created by the Government itself - cases in which women are the ones in charge of businesses are still rare. “In many rural properties, the women are at work, in the day-to-day chores, including triple shifts, as we are aware. But this does not necessarily mean that they are being acknowledged in this regard,” Daiane says.

According to her, there is still a lot of prejudice towards the role of women in rural areas. Women are still associated with taking care of the house, the garden, and the children. “The majority do not hire a woman as the manager of a soy farm, for example. Not that there are not competent women to do this, but because of the sexism that exists around this type of work”, Daiane explains.

Janaína Rocha agrees and points to a pattern in Brazil in which women take over small properties without, however, exercising real command of the business. “Many times, women are the leader, the owner, the production manager, but just in the legal record, at the notary’s office. This is not always reflected in the field”, explains the researcher. However, these same women have taken the lead in changing land exploitation patterns. They have been participating in technology transfer activities organized by technical assistance and rural extension organizations. “We see several stories of families in which, by participating, by listening, by getting involved, women really started to act in this place of prominence. This happens mostly in small properties, traditional communities and land reform settlements,” Janaina says.

Among the large rural properties, the pattern is the opposite, reflecting an “extremely masculine” environment, according to the researcher. “There are

bright, strong, and technically very well-prepared women who eventually lead these big enterprises. But women do not show up because they are perceived as not having credibility to close a big deal, to sit at the table with big investors”, says Janaina. She evaluates that the presence of women in agribusiness is still seen as a “risk factor” in MATOPIBA. According to her, despite the drawbacks brought about by sexism, recent years have shown advances, especially during the years 2013 to 2017, when the Ministries of Environment and Agriculture were run by women.

“It was the time of Izabella Teixeira and Kátia Abreu, who were the respective Ministers of Environment and Agriculture. Several times they were in public debates with women on the agendas regarding MATOPIBA, environmental regularization, CAR and the future of all of it”, Janaina recalls. She remembers the year of 2017, when more than half of the managers in the country’s Rural Environmental Registry were women. “It was a time when we were able to make a lot of progress with CAR. We reviewed every part of the registry of traditional peoples and communities”, she says. In the researcher’s assessment, the feminine view makes all the difference in the dissemination of good practices in the field, especially when it comes to vulnerable groups. “The business environment, the rural environment, the tractor, the chainsaw, the digger, all of this is considered to be a very masculine world. Conversely, the power of speech, persuasion, education and empathy is a very feminine world”, Janaina ponders.

Daiane, from INEMA, agrees. She defends the expansion of projects of extension (outreach) and education aimed at women in the countryside. These women still have difficulties in having access to those spaces because of the social context in which they live. “It is very important to encourage women, for example, to go to universities. Many of them who are in rural areas have not even finished high school. They get married at young age. I think that the transformation in the countryside permeates all of this. The way things are now just facilitates access to opportunities for men and it brings great difficulties for women,” the forest engineer concludes.

In fact, the consulted experts were unanimous in stating that investments in education and qualification will contribute even more to placing women in the spotlight, especially in agricultural activities. In addition to technical

competence, as Janaina Rocha says, “they are sensitive to solving major issues, and environmental regularization needs this one-two of competence and sensitivity”. The forestry engineer says that the example given by the Ministers of Environment and Agriculture serves as an inspiration to all women, in all spheres.

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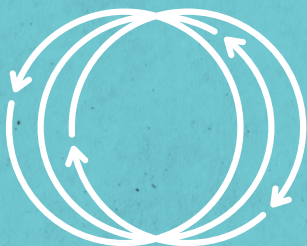
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LOW CARBON EMISSION AGRICULTURE

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greenhouse gases from agricultural activities



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PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the Brazilian rural environment even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF ¹, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This booklet discusses **Low Carbon Agriculture: practices that contribute to reducing the emission of greenhouse gases from agricultural activities**. In Brazil, the ABC Plan ² (Low Carbon Emission Agriculture Plan) is a fundamental public policy instrument that lists the guidelines for achieving low carbon emissions in agricultural practices. In addition to the commitment to reduce greenhouse gases (GHGs), the ABC Plan contributes to the consolidation of economic models based on the 2030 Agenda, promoted by the UN, and on the 17 Goals for Sustainable Development. The ABC Plan meets the sustainability goals by presenting opportunities and strategies to rural workers. Throughout this booklet, the experts **Ivanir Pradella**, **Leonor Assad** and **Marcia Grise** share their opinions and insights.

Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.

2. Available at: <https://bit.ly/3kRhZ4S>.




INTRODUCTION

This booklet contributes to the understanding of women's roles in the agricultural production chain in the MATOPIBA region – acronym created from the initials of the respective component states – MARanhão, TOcantins, Pluaí and BAhia. Female experts, producers, technicians and researchers of the rural environment share their experiences, impressions and obstacles faced along their journeys. Their perception is the thread running through this small, but important, part of history. These professionals work with soybean in one way or another, and that is not by chance. The MATOPIBA region produced 14.94 million tons of soybean in 2019. That represents 12.5% of all soy produced in Brazil in that year.³

The women presented in this study have examples on how Brazil can achieve a more resilient agricultural production focused on low carbon emission. Their narratives come straight from their own life stories. They are women, mothers

3. Conab (2019).

The background of the page is an aerial photograph of a vast, dry forest. The trees are mostly small and have a yellowish-brown hue, suggesting a dry climate. The forest extends to the horizon under a clear blue sky. A large, white, rounded rectangular box is superimposed on the left side of the image, containing three paragraphs of text.

and female scholars who see the rural environment not only as the background of their trajectories, but also as a place of opportunities and dialogue, along with inherent challenges.

The Covid-19 pandemic imposed significant challenges to the elaboration of this work. However, the technology that is important to the development of rural communities also contributed to the production of this series. Analyses of official data combined with online interviews helped investigating the MATOPIBA region and the nation's rural environment as a whole.

Hopefully, the reader can embark and enjoy this rich narrative. The resilience of those who live and work in the fields was something remarkable that transpires in every personal narrative. Understanding the land and its aptitude along with its various perspectives is a decisive factor to guide public policies, to foster technological innovations and to provide a harmonious coexistence with the countryside.

IVANIR PRADELLA

Daughter of rural workers, born in the State of Paraná, married and mother of two girls, Ivanir holds a post-graduate diploma in Agrobusiness Management and is the partner owner of the Pradella Group. She has been in West Bahia for 20 years. She grew up in the countryside and has always worked with all things rural. Her trajectory is built on study, resilience, and much respect for the land that has always given her a living.



LEONOR ASSAD



Agronomist graduated from the Federal University of Viçosa (UFV), with a PhD in Soil Sciences from the Université de Montpellier (France), Leonor is a retired professor of the Federal University of São Carlos. She has studied the Cerrado and the rural environment since the 90s. Her research has brought her to the regions of northern Tocantins, southern Maranhão and West Bahia (these areas are part of the current MATOPIBA region). Throughout her career, Leonor has met with traditional communities and local producers and has observed significant changes in land use over the years.

MARCIA GRISE



Agronomist graduated from the Federal University of Paraná, Marcia holds a MSc in Zootechnics from the State University of Maringá and a PhD in Plant & Crop Sciences from the Federal University of Paraná. She has attended the University of Florida as a visiting scholar and has been a researcher at Embrapa⁴ since 2007. A single mother, she is an expert in Integrated Crop-Livestock-Forestry Systems (ICLFS), forage systems, pasture management, nutrient cycling, carbon sequestration and greenhouse gas emissions. Marcia has worked in the MATOPIBA region for over 14 years and now coordinates the ABC Sustainable Soy Project. This project is an initiative of the Conservation International Brazil in cooperation with Embrapa and local producers.

4. Translator's note: EMBRAPA stands for "Empresa Brasileira de Pesquisa Agropecuária". A suitable translation would be "Brazilian Agricultural Research Corporation".

LET'S CONTEXTUALIZE? A LITTLE BIT ABOUT THE ABC PLAN

The ABC Plan – Plan for Low Carbon Emission Agriculture – is an instrument of integration among government (federal, state and municipal), productive sector and civil society, for the reduction of greenhouse gas (GHG) emissions from agricultural and livestock activities. The plan is composed of seven programs and presents sustainable production technologies along with a program on adaptation to climate change.

The Plan aims to guide agricultural production systems in the adaptation to extreme climate variations. With this goal in mind, the plan fosters the adoption of sustainable agricultural technologies that meet the greenhouse gas emission (reduction) targets set by Brazil.

Leonor Assad points out that “the ABC Plan brings with it a look at the whole, and not only at the parts”. The plan fosters the sustainable production in areas with diverse climates, such as Brazil. Marcia Grise warns that each biome is unique. “It’s no use saying that the Cerrado is not fragile and complex. Although it is still considered an agricultural frontier area, it is [fragile] and it is a delicate region.” This sensitivity, combined with the participation of local women, makes the Cerrado and the MATOPIBA a unique region⁵.

WOMEN'S PARTICIPATION IN RURAL PROPERTIES IN THE MATOPIBA REGION

Among all GGP (Good Growth Partnership) municipalities of the MATOPIBA region⁶, 4.6% of the rural establishments produce soybean and are led by women, according to the 2017 Census of Agriculture. The female soy-

5. Nobre and Oliveira (2018).

6. Barreiras, Formosa do Rio Preto, Luís Eduardo Magalhães, Riachão das Neves and São Desiderio in the Barreiras region, Bahia state; Monte de Carmo, Palmas, Porto Nacional, Santa Rosa do Tocantins and Silvanópolis in the Palmas/Porto Nacional region, Tocantins state. These are the areas covered by the Good Growth Partnership project. The project is implemented by the Conservation International Brazil (CI-Brazil) together with the United Nations Development Programme (UNDP).

bean producers are concentrated in regions of higher soybean production, especially in Bahia, where the 10 soybean-producing cities presented the greatest number of rural properties and largest average area. However, 92% of the rural properties in the MATOPIBA region are led by men. Marcia Grise, who teaches training courses in the region through Embrapa, confirms the existence of a male-dominated culture. “When I go to teach [training] courses, I’m super happy when there are women. They usually do a fantastic job, but unfortunately there are not many of them yet”, Grise says.

30% of the farms run by women in MATOBIPA produce soybean.

According to Leonor Assad, women tend to work in mini- and multi-crop systems (e.g. agroforestry systems) cultivated in the backyard of their properties. “The monoculture systems, usually more physically demanding, end up being



dominated by men”, she argues. For Marcia Grise, women are the leaders in the small farming areas. She notes that in other regions, which she has studied as well, women implement and run agricultural practices mostly around their homes – “men go to the city to work other jobs”.

The time of things, the culture of the soil and the history of people

“I do not enjoy the view of soybean being a commodity. It is much more than that. The survival of this crop relies on a paradigm shift. In the conflict between mankind and environment, let us have no doubt: mankind bears the loss.”

Leonor Assad

Aptitude. This simple word summarizes very well how the experts see the soy crops in Brazil. For Assad, the soil, the climate, the technological expertise and the productive force are fundamental to understand the timing of the crops, the soil yield and the respect to the peculiarities of the territory. But what is necessary? For her, the list includes adequate soil, appropriate fertility, and technological expertise.

Marcia Grise also summarises the guiding line of sustainability as a tripod. The tripod is productive sustainability, under an economical perspective, with an eye on producers; environmental sustainability to guarantee the necessary means for the future generations; social sustainability to maintain communities, territories and State all autonomous, with an ensured capacity for production and subsistence.

"Social sustainability is fundamental for the balance of MATOPIBA, because we need to keep that community in that region. So, in the projects that I coordinate, I always try to work with this [social, economic and environmental] tripod."

Marcia Grise



In most tropical areas, there is a wide range of species that are appropriate and equally dependent on the environment's potentialities. There are limits, however. Fertility, for instance, can be enhanced only to a certain point.



"We cannot enhance fertility indefinitely, because we currently enhance fertility using soluble fertilizers. If the soil is very permeable, with a high content of sand, part of the fertilizer will be lost and that loss adds to the production cost and has an impact on the environment itself. So, it depends on the soil fertility and the water content of the soil as well."

Leonor Assad

"We are going to produce, because people need food, because they need that craft, but with responsibility, considering good agricultural practices integrated with good environmental practices. The important thing is that we manage the land properly."

Marcia Grise



The water content in the soil relies on the soil's capacity to retain water and this water can come from rains or artificial irrigation systems. The inherent potentialities of both soil and climate are very important for the production of soybean. The crops are cultivated in specific periods and that is not by chance - these periods provide an adequate rainfall. However, the rainfall regimen and soil composition are not uniform across the country. Brazil exhibits continental dimensions extending from 5° North to 33° South and from 35° East to around 75° West. That creates great bioclimatic variability.

"Note that the U.S. also has great climatic variability, but the country is limited by two oceans. They exert great influence and the U.S. does not extend to several latitudes like Brazil", Assad explains.

Brazil then exhibits several climates that allow the cultivation of diverse crops. Tropical and temperate cultivars grow well in the South American country, when considering crops with short life cycles, even more varieties are suitable.

"The people from the MATOPIBA region have their own culture. However, there are people who immigrate to the region as well. The attractions, including cheaper land prices, bring in people from several other regions. These migrants carry their own culture with them and often want to cultivate the new land according to their own traditional practices. Oftentimes, the new inhabitants forget to consider the vocational aspirations of the locals", Assad emphasizes.

In fact, (low) land prices are the main factor that attracted new producers to the region. Nevertheless, good soil management is what determines productivity and longevity of the fields. According to Marcia, Tocantins presents severe climate constraints. "In the state of Tocantins, we add a lot of organic matter to the soil, a lot of natural coverage to protect the soil from the sunlight during the dry season. Maintaining humidity in the soil is fundamental because there is no rainfall from May until the end of October. During this period, there are no rains and the temperature can reach 42°C", Marcia highlights.

Soybean has been cultivated in large areas in the MATOPIBA region. Generally, the production costs are higher when cultivation areas are smaller or when environmental adversities are more predominant. If there is not enough water,

"One should not hope to be competitive when cultivating just one hectare of soybean."

Leonor Assad



more fertilizer might be needed; if the terrain presents unfavourable conditions (slopes, for instance) that will also increase the costs. However, the MATOPIBA does not suffer from these limitations.

The cultivation process can be scalable only when cheap and qualified labor force are available or when mechanization is possible. There is state-of-the-art technology for the mechanization of soybean cultivation, but this comes at a cost, notes Assad.

According to her, the sentiment of superiority of mechanization over the vocation and potential of a given territory is a big obstacle to sustainable development. In the MATOPIBA region, which is consolidating itself as a national agribusiness centre, with soy as a major driver in this process, the situation is even more challenging.

"My perspective is based on the natural timing of things and the environment. So many things could be done in that region. They could invest in forestry, for instance, which is based on perennial species and, therefore, is a more resilient system. If the soy goes 15 days without enough water, the whole harvest can be lost, because this crop is way less resilient", Leonor ponders.

For this reason, Marcia Grise can only imagine growing soy in the MATOPIBA region using no-till farming techniques, preferably combined with crop rotation systems. "If we adopt low carbon emission agriculture, we can consolidate our production into a smaller area, therefore reducing the need for new areas and the risks associated with monocultures. We need the cultivation of high mass forages that can sequester carbon into the soil, and the integration of agricultural systems with livestock", Grise says.

It is the timing of things, the culture of the soil and the history of people...

Changes happening in the MATOPIBA region according to experts

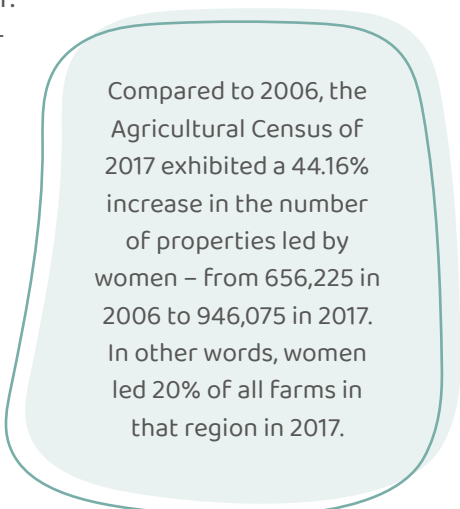
"I have worked with Integrated Crop-Livestock-Forestry Systems since undergraduate school. I do not work with soy only. I work with soy in integrated systems and that is a very different perspective."

Marcia Grise

The Good Growth Partnership has a multidimensional view on the concept of development. Various social and economic players affect the sustainable productive activities in the MATOPIBA region. In this scenario, women are moving towards greater importance throughout the soybean production chain. The ABC Sustainable Soy project is an example of that. The project is the result of a cooperation between Conservation International Brazil and Embrapa and Marcia is the coordinator.

Although the team has only preliminary results of 2021, Marcia Grise already has two victories to celebrate.

"The first victory is about productivity. The data show that the regions that followed the ABC Sustainable Soy guidelines exhibited higher productivity compared to previous years. Obviously, there is room for improvement still, but things are getting better already. Next step would be to introduce crop rotation, for instance. The other victory is a victory of gender because



Compared to 2006, the Agricultural Census of 2017 exhibited a 44.16% increase in the number of properties led by women – from 656,225 in 2006 to 946,075 in 2017. In other words, women led 20% of all farms in that region in 2017.



two women coordinate the project: Iamilly and I”, celebrates Grise. Iamilly Cunha is the project coordinator of CI-Brazil.

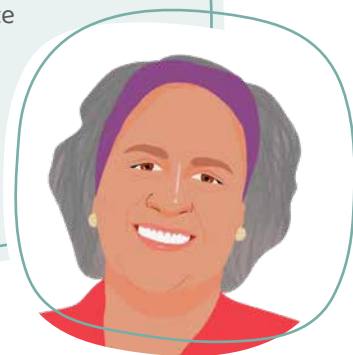
For Leonor Assad, who is in close contact with the region, the impression is that there is a change in mentality. She points out that the territory’s development has an intrinsic relation with the change in women’s participation in the field. That is also what the Agricultural Census data show. From 2006 to 2017, there was a significant increase in the number of women leading agricultural properties not only in MATOPIBA.

Medium-sized rural properties that are led by women are evenly distributed in the region, even though they correspond to only 6% of all properties. Conversely, mini properties are concentrated in Maranhão, mostly in the northern region close to the coast. Mini properties represent 54.5% of all rural establishments in the MATOPIBA, and 71.2% in the Maranhão State alone.

In Tocantins, women lead 64.9% of the small properties, 15.2% of the medium-sized establishments and 1.9% of the large farms. Regardless the size of the property, implementing sustainable agricultural systems is a common goal, even though there are major differences depending on the system in place – the ABC Plan has several ideas of productive technologies aimed at this scenario. In the commodity producing regions, especially Tocantins, larger properties prevail.

"The MATOPIBA region – a fringe that surrounds the Amazon Forest – exhibits a real change in land use. It is one thing to look at the data from remote monitoring centres, another thing is to walk in the region and talk to local producers. I have realized that there is a change, including a change in mentality. I am even curious about what happened with that community in the far north of Tocantins: whether the community remains untouched, whether the locals continue to live as before. In the late 90s, they used to depend heavily on governmental assistance. Maybe this has changed."

Leonor Assad





Tell us a bit more, experts!

“ It is fundamental to look at the whole production chain. Women can be the head of the family who wakes up and milks the cows and drives the tractor, or they can manage big agribusiness groups. We are also present in agribusiness-related companies, such as fertilizer and machinery retailers and consulting firms. The possibilities are many and it is through a support network that we strengthen ourselves to cope in a male-dominated environment. ”



Ivanir Pradella

“ Women is becoming empowered. Little by little... We are changing the countryside. It is a process! ”



Leonor Assad

“ Maybe it is easier for women to interact with the new, to break the paradigms! I keep wondering (and asking myself) if women are less conservative than men... ”



Marcia Grise

Generation after generation: what do we observe in the field?

The age of the person responsible for the rural establishment reflects, in part, whether the property is close to the moment of intergenerational change. In the countryside, the discussion about family succession and the choice of who will continue the agricultural activity is increasingly frequent.

According to the 2017 agricultural census, most women (62.7%) who run agricultural establishments in MATOPIBA are 45 years old or more. 33.6% are between 25 and 45 years old and 3.7% are up to 25 years old.

It is important to have knowledge and maturity to manage a property. Although age is not a determining factor for the managerial role, finding that 37.3% of the properties in MATOPIBA are led by women aged 45 years or less shows that the region has had the participation of a younger and more heterogeneous generation.

Table 1 - Age of women who lead agricultural properties (%)

Region	Up to 25 years of age	25 to 45	45 to 65	65 +
Tocantins	2.5	28.4	47.3	21.9
Maranhão	4.5	38.1	42.4	15.1
Piauí	3.5	28.3	40.3	28.0
Bahia	2.9	28.7	43.1	25.3
MATOPIBA	3.7	33.6	43.3	19.4

Source: IBGE (2019).

THE FUTURE IS SUSTAINABLE (AND INTEGRATED?)

“It is as though the cultivation cycle controlled the thought cycle.”

Leonor Assad

Willingness to do differently. Certainly, with the great challenges and significant changes that the world imposes on each one of us, this statement is even more relevant. Much has been said about the integrated agricultural production systems. These practices require an area for crop cultivation in consortium, rotation or succession, and may even recover thousands of hectares of degraded pastures. They also reduce the pressure to open new areas covered with native vegetation, in addition to mitigating greenhouse gas emissions.

From the perspective of the consulted experts, there is still resistance from the traditional producers to adopt low carbon emission technologies. That might be due to the lack of knowledge, the need for technical assistance and rural extension (ATER⁷) services and the fact that there is more work involved in these new technologies.

"We have a group, the farmers, that has many challenges to do differently. This group is, by cultural background, more conservative – and this is not pejorative. Farmers are at greater risk. If you work within a covered factory with amenities, you take risks, they are different risks than those present in the open fields. Have you ever worked in an open field? If there is heavy rain or an unforeseen windstorm, and if I have no windbreak, the crop that is starting to develop or to grow seeds will suffer. If I plant an entire flat surface only with soy, all at about the same height, the wind will spread much faster than if I had plants of different heights, and the soy crop will suffer. So, farmers take risks."



Leonor Assad

7. Translator's note: "Technical Assistance and Rural Extension" services are referred as ATER in Brazil. Through these services, public and private institutions provide producers with trainings, field excursions and even equipment and inputs. "Rural Extension" could be translated to "Rural Outreach".

Leonor Assad explains well what roadblocks farmers face. Beyond the very first obstacle, which is to think that one can do differently, farmers need minimal knowledge or minimal technical assistance that allows them to do differently. Studies by Embrapa Cerrados show that when cultivating soybean in an Integrated Crop-Livestock-Forestry System (ICLFS), it is possible to use the land during 90% of the year – which greatly optimizes the work. But, according to Assad, this system requires more dedication.

Marcia Grises explains that integrated (and intensive) agricultural systems have a land-saving effect. They consolidate production into smaller areas and reduce pressure to open new plots. However, technical assistance is important to support and help the producer. That is why when Marcia proposes the integrated systems as an alternative for the future, she points to the importance of government bodies of technological support (generally referred as Technical Assistance and Rural Extension – ATER⁸ in Portuguese). “Our world here [in the MATOPIBA region] involves a lot of rural extension work, but there are very few women that work in the technical assistance and rural extension activities”, affirms the expert.

Grise, which has been contributing to the region with her experience in ICLFS, has managed to win more and more adherents to low carbon emission practices. The advantages of integrated systems go beyond the benefits to the soil.

“In some regions, depending on the ‘harvest window’, we can have up to three harvests in a year (from January to October), which diversifies the income sources as we diversify the crops.”

Marcia Grise



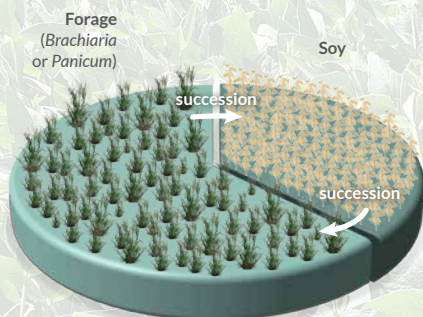
Integrated systems are complex systems, full of interactions among their components. There is a need for specific and adequate management as well. It is necessary to understand the system, the soil, the plant, the animals, the climate and their interactions.

8. The brochure 4 discusses the importance of Technical Assistance and Rural Extension (ATER) bodies.

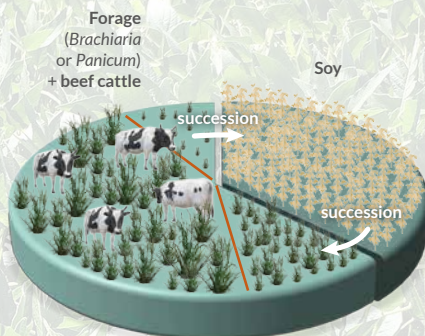
ABC SUSTAINABLE SOY PROJECT IN THE MATOPIBA

Integrated Crop-Livestock-Forestry Systems (ICLFS)

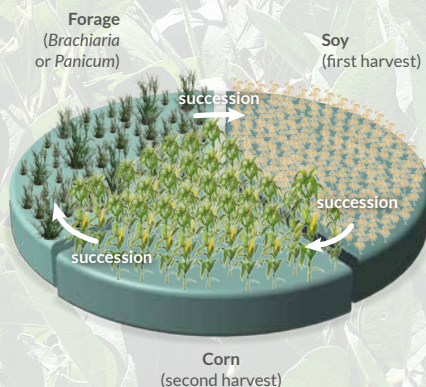
One complete agricultural year



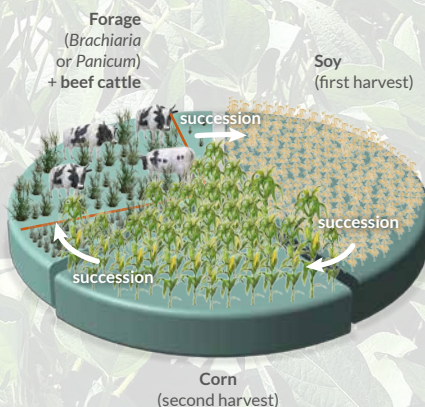
One complete agricultural year



One complete agricultural year



One complete agricultural year



Elaboration: ECONSULT.

"I do not see how one can sustain oneself in this activity, without a constant and well-done management, in order to reduce the pressure for the opening of new areas".

Marcia Grise



By diversifying the production, the producer becomes resilient to external adversities and to price fluctuation of a single product. Grise confirms she has seen many gains with the adoption of more intensive agricultural practices, including pasture intensification and raising livestock in rotational grazing (which frees up pastures to other activities).

Marcia points to the ABC Sustainable Soy project to illustrate that it is possible to have a sustainable production of soy, a commodity so important for the agribusiness in Brazil.

ABC Sustainable Soy

The ABC Sustainable Soy project, which is a partnership between Conservation International Brazil and Embrapa, foment the transfer of agricultural technologies in Tocantins. Its main objective is to promote the idea that sustainable production can also be more economically feasible. The project also seeks to train extension (outreach) workers and enhance technical assistance, both public and private, especially for small and medium-sized producers.

Through this assistance, local producers can acquire technologies that lead to a more sustainable production. "Among the technologies recommended and transferred to producers, there is no-till farming, crop rotation and ICLFS (Integrated Crop-Livestock-Forestry Systems)", explains Grise, coordinator of the project.



What does reality show us? Low carbon emission agriculture is already here

“This is my goal, to work with the tripod of sustainability, always considering good agricultural practices, good environmental practices and generating new opportunities for producers.”

Marcia Grise

In 1994, the Pradella family was already using the no-till system in Paraná state. In 2004, they migrated to Bahia and after opening new areas and preparing the soil in the conventional way, they adopted the no-till system once again. Currently, the Pradella group is known in the region for their good soil conservation practices.

The main goal of no-till farming, which is also one of the sustainable practices promoted by the ABC Plan, is to increase the soil cover and aggregation, through plant roots, and consequently increase organic matter. The organic matter, which originally was 1.5%, doubled in Ivanir's property. This result can only be achieved through a process of continuous soil improvement with environments adapted to the no-tillage production system.



“To achieve this result, we have adopted a rotational process for both soybean and corn. One third of the area cultivated with corn in consortium with brachiaria and two thirds of the area cultivated with soybean in succession with mombaça, sorghum, millet and other seasonal crops.”

Ivanir Pradella

The cultivation of interseason corn is expanding substantially in the MATOPI-BA even in non-irrigated areas, when the “seeding window” allows, according to the agricultural zoning of climate risk (ZARC)⁹. When there are no climatic conditions to cultivate interseason corn, other grasses such as millet, sorghum and brachiaria are planted after soy. What really provides a boost to the soil in terms of coverage and roots is the intercropping of corn with brachiaria, which happens once every three years.

Biological products are also used, such as *Bradyrhizobium*, in soybean, for biological nitrogen fixation (BNF) and *Azospirillum*, in corn, to stimulate the growth of corn plants. This practice has provided the control of nematodes and improved soil conditions. Increased soil water infiltration and storage, decreased soil compaction, and numerous other advantages for the crops have improved cultivation operations and crop management as a whole.

Other benefits include the increase in organic matter. Pradella highlights “we know that it is a slow process, but with great benefits when compared to the conventional system which, after the rain, allows quality seeding for only three, at most four days. After that, the soil no longer offers good seeding conditions.”

“When applying these cultivation techniques, we produce food in a sustainable manner, attending to the environmental, economic and social pillars.”

Ivanir Pradella

9. Available at: <https://bit.ly/3h6P1Dg>.

WHAT ARE THE PROSPECTS?

Women have an enormous potential to lead skillfully a more contemporary vision on sensitive issues regarding sustainable development in the MATOPIBA region. They play a key role in the change that the world so desperately needs. Women are social and economic players that are distributed along the soy production chain and many are leaders within rural properties. They can contribute to the development of the MATOPIBA as partners in the family farm management. They have great potential to increase the interrelationship between people in general, and between producers and traditional communities, increasing the social capital of the MATOPIBA territory.

As Leonor Assad points out, knowledge products, like this booklet, strengthen the role of women as agents capable of transforming the production systems in the field. That does not imply that women are better than men.



© Wenderson Araújo / Sistema CNA / Sehar

Women care for the family and food with a strong natural tendency to be agents of transformation for possibly more incredible futures. “It is possible to do it differently and be sustainable. Not only environmentally, but from the health point of view or the economic aspect as well”, Assad recalls. “If you have all the technology and all the machines with the same old way of using the soil and same timing, if you always bet on the same model, your risk is much greater. It is necessary to change, to reinvent, to understand the very wise cycle of nature itself. Women can be these agents of change”, the expert emphasizes.

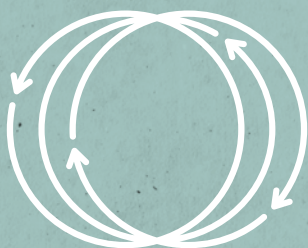
Incorporating effective practices will promote environmental sustainability in MATOPIBA. The greater participation of women in all aspects in the countryside is a stepping-stone for further development of agriculture. New agricultural practices must meet the three pillars of sustainability at a level consistent with the great challenge for all of humanity: we must take care of the world in which we live in. After all, we have just one planet. Are we together in this?

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GOOD GROWTH PARTNERSHIP





RURAL CREDIT

Risk management and financing
opportunities for sustainable production



GOOD
GROWTH
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CONSERVAÇÃO
INTERNACIONAL



Brasil

GENDER PERSPECTIVES FOR SUSTAINABLE
PRODUCTION IN MATOPIBA

RURAL CREDIT

Risk management and financing
opportunities for sustainable production

Brasília/DF, 2021

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Matheus Sanitá Lima

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This series of booklets “**Gender perspectives for sustainable production in MATOPIBA**” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the Brazilian rural environment even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF¹ –, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This booklet discusses the theme **Rural Credit: Risk management and financing opportunities for sustainable production**. What is the role of gender in this discussion? How does gender fit in the borrowing and lending dynamics in the rural credit market? How does gender influence the agricultural production? The experts **Priscila Zeraik de Souza**, **Stela Herschmann** and **Thaís Fontes** present their opinions and contribute to the discussion.

Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.



INTRODUCTION

This booklet seeks to analyse rural credit lines under the perspective of gender. With the help of experts, this publication presents the main credit lines focused on women and sustainability. The credit dynamics in MATOPIBA – MAranhão, TOcantins, Plauí and BAhia – are also analysed. The experts describe the typical borrower and debt payment relationships. They also explain how these numbers tell a story about the financial reality in rural areas. The experts' perception is the thread running through this small, but important, analysis.

The Covid-19 pandemic imposed significant challenges to the elaboration of this study. However, the technology that is necessary to improve production processes in the rural environment also helped the elaboration of this work. Analyses of official data combined with online interviews with female experts contributed to the analysis of whether economic programs directed to women have been effective.



PRISCILA ZERAIK DE SOUZA

An economist graduated from the Federal University of Rio de Janeiro (UFRJ), Priscila holds a MEd from the Getulio Vargas Foundation (FGV) and a PhD from Yale University. She has been studying labour economy and economic development for 10 years. She was a professor of Economics in the *Université de Toulouse* and since 2014 she is the Coordinator of Public Policy Evaluation at the Climate Policy Initiative (CPI) of the Pontifical Catholic University of Rio de Janeiro (PUC-Rio).

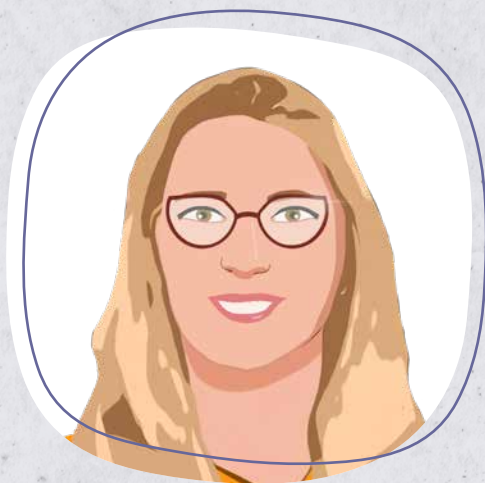
A lawyer graduated from PUC-Rio, Stela holds a master's degree in Environmental Law and Environmental Policies from Duke University and an MBA with emphasis on public policy evaluation from the Getulio Vargas Foundation. She has extensive experience with climate issues. Her work with American NGOs focused on advocacy for rapid mitigation of climate change. She was an Analyst of Financial Instruments at the Climate Policy Initiative (CPI) until 2021.

STELA HERSCHMANN



THAÍS FONTES

A veterinarian with postgraduate degree in Food and Processes Quality Management, Thaís holds an MBA in Agrobusiness from the School of Agriculture “Luiz de Queiroz” of the University of São Paulo (ES-ALQ/USP). For almost a decade, she worked with Quality and Processes in the animal feed industry. Since 2016, she is manager in sustainability at Rabobank – a Dutch multinational banking and financial services company founded in 1895. In 2021, she joined Rabobank’s Food & Agri Networks team. Rabobank has been operating in Brazil for 30 years and it focuses on agribusiness and the food sector.



WHAT IS RURAL CREDIT?

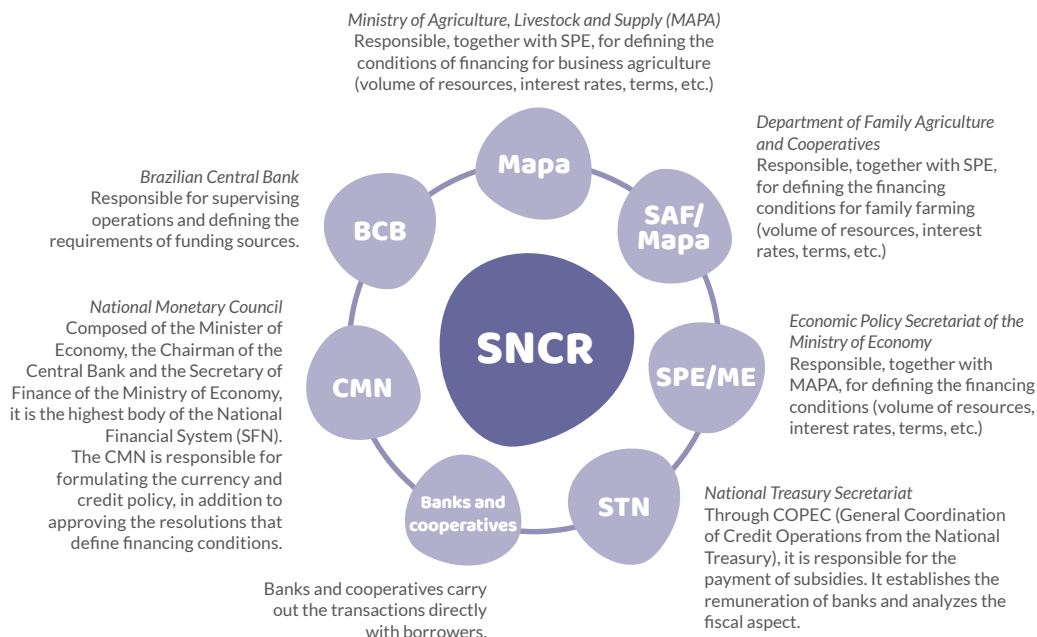
It is the supply of financial resources geared to farmers and cooperatives. These resources might come from public bodies or private credit suppliers (institutions from the National Rural Credit System – SNCR). The use of such resources must follow the goals and conditions set by the Rural Credit Manual (MCR).

Source: Confederation of Agriculture and Livestock of Brazil (CNA), 2018.

The modernization of the Brazilian agriculture, which started in the 70s, was fundamental to the establishment of Brazil as a world food supplier in recent decades. Along with technological advances, the creation of a system for rural credit was essential. This system offered tailored subsidies with nominal interest rates lower than those from the market. Subsidized farmers could expand the production of commodities such as soy, instead of focusing only on domestic market produce, such as beans and cassava. Rural credit lines were a real turning point for the national production. The fields could now be innovated with technologies tailored to the diverse climate and soil conditions throughout Brazil.

The credit lines for the agricultural sector originated through the establishment of the National Rural Credit System (SNCR) – Law number 4829 of November 5th, 1965. The SNCR was originally formed by the Central Bank of Brazil, the Bank of Brasil S/A, the Bank of Amazonia S/A and the Bank of the Northeast S/A. Currently, the SNCR includes the National Bank for Economic and Social Development (BNDES), private and state banks, savings banks, rural credit cooperatives and credit, financing and investment companies.

Figure 1 - National Rural Credit System (SNCR)



Source: Vesconi (2018).

Beyond the credit system, the agricultural sector counted on Research & Development from institutions such as the Brazilian Agricultural Research Corporation (Embrapa)². Particularly in the case of soybean, credit lines and genetic improvement allowed not only an increase in productivity, but also the expansion of this crop to other regions, which advanced the agricultural frontiers³.

During the last two decades of the 20th century, the expansion of agricultural frontiers was a dynamic process that happened especially in the Cerrado. Cerrado is one the biomes in Brazil and it has become the main grain producer in the country. Brazil has also been a pioneer in sustainable production techniques, such as no-till farming, and these techniques are now implemented in the MATOPIBA region. The newer grain production areas, such as the MATOP-

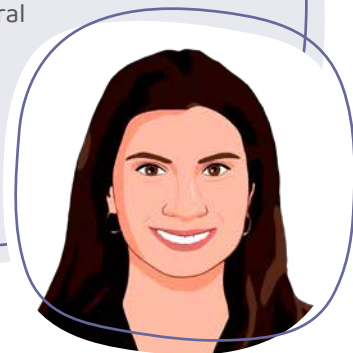
2. Translator's note: EMBRAPA stands for "Empresa Brasileira de Pesquisa Agropecuária". A suitable translation would be "Brazilian Agricultural Research Corporation".

3. Diniz (1995).

IBA, can further increase their sustainability within the farm still and rural credit lines will be a key instrument for the adoption of sustainable technologies.

Why rural credit?

For Priscila Zeraik, the rural credit system is the main policy that exists for the agricultural sector. In terms of volume, the system accounts for over R\$ 200 billion – a highly significant amount. Priscila explains that this subsidized resource is very important, and it has real impact on land use. “If we want a more sustainable agricultural production, we have to produce better and use less land. We need this public policy instrument to be as efficient as possible”, she highlights.



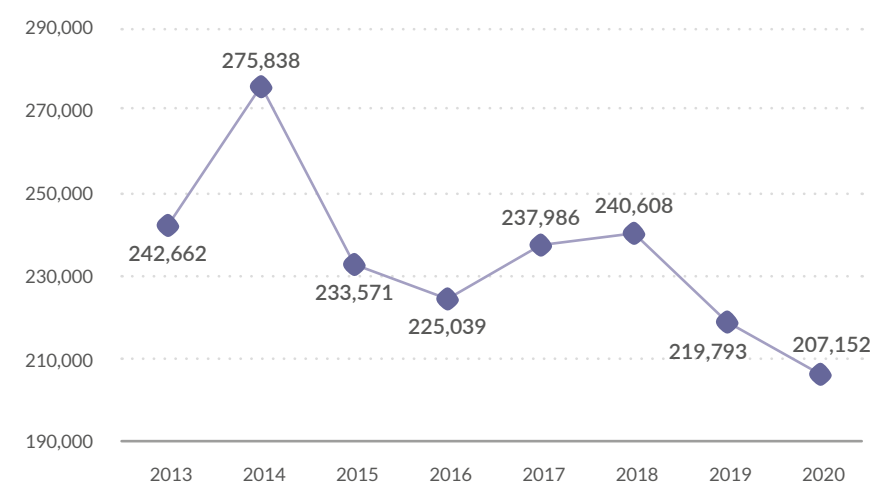
HOW IS THE RURAL CREDIT DISTRIBUTED IN BRAZIL?

The availability of credit went through several periods. From large volumes of credit to complete rationing. The 70s saw the first concession phase with subsidized interest rates. This period was decisive to set the motion of the national agribusiness development. In the following decade, the sector was not immune to the deep economic crisis caused by hyperinflation and aggravated by the fiscal crisis and external debt. For the credit system, the 80s were the lost decade. During this time, a few funding schemes were created, but other SNCR funding sources were extinguished.

The Real (R\$), a new national currency, became stable during the late 90s. Innovative financial instruments, such as the Commodities Fund, the Rural Product Note, and the stock exchange, replaced outdated public resources and allowed the establishment of several agricultural and livestock derivatives. Pronaf – the Family Agriculture Strengthening Program – was created and credit lines to small farmers were opened.

Throughout the first decade of the 21st century, credit sources saw an increase in volume again. The agricultural sector started to rely on other financial products, such as resources not controlled by the government. An insurance system tailored to the rural production, known as agribusiness securitization, was also created. This trend deepened in the following decade. The reduction in basic interest rates encouraged the participation of uncontrolled (private) funds, such as the Agribusiness Credit Letter (LCA). Credit unions also increased their participation as credit providers. In recent years, there has been a reduction in the volume of rural credit, with sharper drops from 2015 and 2018. However, given the deep fiscal crisis that the country is experiencing, there could have been an even more intense contraction.

Chart 1 - Brazil: total volume of rural credit* (2013-2020) (in million R\$)

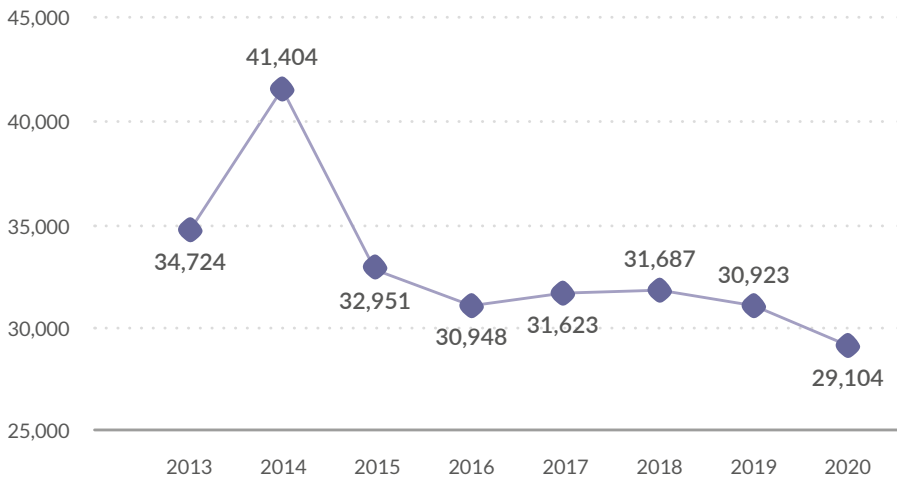


Source: Rural Credit and Proagro Operations System (Sicor) of the Brazilian Central Bank, 2021.

*Values adjusted by the General Price Index – Internal Availability (IGP-DI) for 2020.

The 21st century has brought new challenges to the agricultural sector and a new structure for granting credit has emerged. Commodity producers, who are closer to the international market, are switching to private credit, whereas family farmers rely mostly on the public credit system. Pronaf's credit volume followed the trend of the country's rural credit system. The program developed, in terms of volume and modalities, with the implementation of new credit lines to serve diverse production processes and to strengthen certain population groups.

Chart 2 - Brazil: Pronaf - financial volume, costing and investment credit*
(2013-2020) (in million R\$)

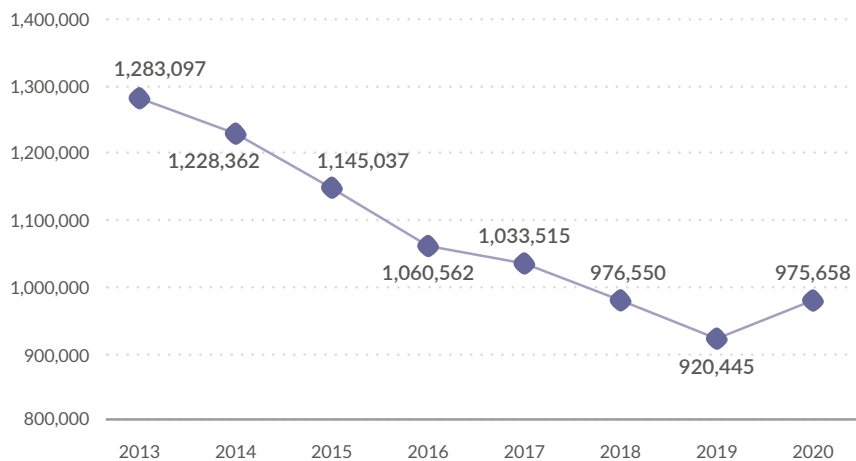


Source: Sicor/BCB, 2021.

* Values adjusted by the IGP-DI for 2020.

The number of contracts fell by a third in the same period. This drop means that Pronaf is attending fewer family farmers and the remaining contracts cover larger amounts of credit.

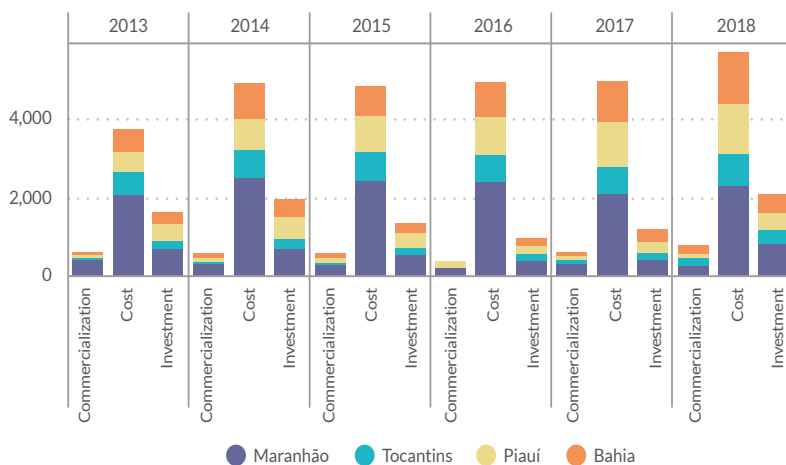
Chart 3 - Brazil: Pronaf - volume of contracts, costing and investment credit (2013-2020) (in quantity)



Source: Sicor/BCB, 2021.

The rural credit dynamics in the MATOPIBA region follows the national trend. Between 2013 and 2018, all MATOPIBA states saw an expansion of credit lines. That indicates the importance of the SNCR resources to finance local production.

Chart 4 - MATOPIBA: total volume of rural credit (2013-2018) (in million R\$)



Source: Sicor/BCB, 2021.

Elaboration: Embrapa.

Credit focused on women

Pronaf Mulher (“Pronaf Women”), created in 2004, was another way to increase women’s access to credit and to promote their social and economic mobility. Borrowers usually are those who lead the agricultural properties. According to the 2017 Agricultural Census, the women leading farms in the MATOPIBA region are between 45 and 65 years of age and tend to own smaller properties – they are mostly small producers or family farmers.

The Climate Police Initiative (CPI) estimates that women take on 32% of Pronaf’s contracts. Compared to previous years, this percentage is high. However, it still corresponds to a small amount of the whole program. “Pronaf is a robust program, it is one of the largest rural credit programs we have. These contracts taken by women cover only 17% of the whole amount of credit available”, points out Stela Herschmann from CPI. She says that the average value taken by women is less than half of the average value taken by men. “There are many elements that we can identify to explain this. One hypothesis is that properties that are smaller have less to offer as a guarantee of credit”, she explains. However, she reiterates that Pronaf Women has seen a decrease in borrowing since 2015. “There are many more women taking loans from other Pronaf credit lines”.

Yet, the Pronaf Women program may have been the first experience that countless women had with bank agencies and the financial environment ⁴. Therefore, Pronaf’s agricultural credit system has been an important instrument for conquering the public space ⁵. These credit lines opened new opportunities for female farmers from different social groups, especially those among the poorest.

What do the data show?

According to CPI, the total value of rural credit taken in 2019-2020 was around R\$ 189 billion. Of this amount, 77.5% (R\$ 147 billion) went to natural persons. Sorting out this value by gender reveals the low participation of women in the rural credit market. As pointed out by Herschmann, women took

4. Brumer and Spanevello (2011).

5. Hernández (2015).

27% of the total number of contracts. However, that represents only 15.5% of the final amount lent to all individual borrowers. The average loan granted to women must be smaller then.

Table 1 - Brazil - rural credit concession, by gender (2014-2015 to 2019-2020 (in R\$))

	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Average value of all credit contracts	42,609.81	48,950.18	51,421.56	57,967.26	69,946.68	77,116.74
Male borrowers	48,292.23	55,584.22	59,851.34	67,816.34	80,587.28	89,284.29
Female borrowers	25,816.41	29,380.13	28,796.20	31,840.85	40,424.49	44,289.16
Average value of Pronaf contracts	12,238.36	12,510.51	13,748.96	14,191.85	16,485.23	18,938.47
Male borrowers	14,555.60	14,933.91	16,884.21	17,413.44	20,055.49	23,107.42
Female borrowers	6,698.98	6,753.84	6,981.42	7,418.81	8,718.54	10,007.12
Average value of Pronamp	74,456.91	102,340.24	106,831.13	118,302.35	133,873.97	150,371.00
Male borrowers	73,051.73	100,703.62	104,989.46	115,971.76	130,151.11	145,405.49
Female borrowers	82,858.08	112,454.62	117,605.83	132,666.34	156,108.80	181,172.60
Average value of other credit lines	148,068.55	170,306.48	188,054.18	210,935.07	235,773.55	292,516.93
Male borrowers	145,993.26	167,210.30	185,319.11	208,522.55	232,908.24	288,080.43
Female borrowers	161,150.80	190,396.39	205,663.84	226,535.42	253,999.21	320,963.14

Source: Sicor/BCB, 2021.
Elaboration: CPI/PUC-Rio.

When sorting producers according to their production volume, women participated more in smaller properties over the last six crop years (2014-2015 to 2019-2020). Small female producers took 31% of Pronaf contracts, which accounted for 16% of the total value offered by the program.

The same was not observed for medium and large producers. Among mid-sized farmers, the contract values taken by women were 14% higher than the average value taken by men. Among large producers, the average value difference drops to 10%. However, the number of contracts taken by women was considerably lower. Only 14% of Pronamp contracts were signed by female producers. “In the Pronamp, a credit program for medium farmers, women acquired contracts with an average value higher than that of their male counterparts in 2019-2020. In fact, the average value of contracts taken by women in Pronamp was higher than for men in all agricultural years. This trend stood out particularly in the years of 2019-2020”, Priscila highlights.



Pronaf and Pronamp

Pronaf, a credit scheme for small rural producers, is the program that promoted the greatest gain in forest area. As this credit line expands, degraded pastures are converted into cultivated areas, whereas the overall area dedicated to agriculture and livestock decreases. Pronaf then funds production processes that are more intensive and consequently reduces the pressures coming from deforestation. Conversely, this positive effect seems not to happen with the Pronamp credit line – a program for medium-sized farmers. The same applies to Rural Savings lines with Controlled and Mandatory Resource lines. The Central Bank then seeks to create strategies and devices through the National Rural Credit System to foster sustainability within rural properties. These devices will offer subsidized credit to producers who adopt agricultural practices that reduce the impact of agricultural activities on the environment⁶.

According to Sicor/BCB (2021), the contracts under the ABC program had a total value of almost R\$ 2.25 billion in 2020. The Midwest and the Southeast regions were the ones that raised the most funds from this program: 34% and 22%, respectively. Men borrowed 85% of the total value. The average contract value for the male producers (R\$ 492,702.67) is 7% higher than the average contract value of female producers.

After the Safra Plan created a specific credit line for women through Pronaf, it was time to implement a more sustainable strategy: the ABC Program. ABC was developed in 2010-2011 to finance low greenhouse gas (GHG) emission technologies. This program is described in more detail in Booklet 2 of this series.

Since then, rural credit has been used as an instrument to encourage environmental regularization through the Rural Environmental Registry (CAR) and Payments for Environmental Services, which are described in Booklets 1 and 9 of this series.

6. Souza, Herschmann and Assunção (2020); Assunção and Souza (2020).

Profile of female borrowers

“What we see, in general, is that when women are in charge [of properties], they are in charge of the small ones. This makes, in terms of volume, their average contract smaller. In larger properties, the percentage of women is negligible.”



Priscila Zeraik de Souza

“The Northeast region is the one that has the most female borrowers in the country. Women acquired 43% of the contracts in this region. In the South, this number is just over 12%. In the Midwest and the North regions, the numbers are 17% and 18%, respectively. We observe that the Northeast region is different indeed. However, the average contract values differ even more. Even in the region where there are more female borrowers, the total amount taken by women is much lower.”



Stela Herschmann

EDUCATION AS A WAY TO EMPOWER GIRLS AND WOMEN

“Education is going to give direction to where women go.”

Thaís Fontes

Education has an intrinsic value for all people, but mainly for women. In several spheres of life - social, economic and political - women are the group that currently has disadvantages in various aspects in relation to men. However, women are not the minority. It is important to point out that gender roles are perceived and acquired through socialization. They are institutionalized through educational/political/economic systems, legislation, culture, and traditions. Education can then be a window to broaden the horizons that are presented to women. Even today, rural areas have mostly patriarchal structures. Intra-family and hierarchical relationships make it difficult for women to participate in the productive and public spheres. Above all, women have challenges when leading rural properties, even when they do most of the work in and out of the farm.

This context is an important factor to understand the dynamics related to the distribution of credit in Brazil and the direction of rural properties, as explained by Priscila Zeraik. “In order to have gender equality, we certainly need to bring people into the educational system, because many measures, like Pronaf Women, are already working on a system that is all crooked from the beginning.” She argues that an efficient educational system has the capacity to retain girls and women in school, with a solid horizon for qualification, including incentives to stay in technical schools. “In primary and high school, for example, the dropout rate among girls is already high for various reasons, such as pregnancy, or the need to help with domestic work, especially in more unequal regions. If we can solve this and bring [and keep] these girls in school, we will certainly have a big impact. But it is a long-term process”, she argues.



Thaís Fontes, sustainability manager at Rabobank - a bank that has been operating in Brazil for 30 years exclusively with credit for agribusiness and the food industry -, reiterates the role of education. “I believe that education is going to give a direction to where women go. I am talking not only about those who are already graduating. The education I mean is the basic education. It is about reaching those girls from rural schools, girls from cities that are agro-industrial hubs and show them that they can be anything they want, including rural producers”, she concludes.

Formal education is the force capable of promoting an even more substantial change in rural communities and the challenges are still significant. In the MATOPIBA region, 72.5% of women leading farms have incomplete primary education. 29% of those are illiterate. Communities can implement sustainable agricultural processes only through the utilization of available technological capital, the learning of which should be easier with higher levels of literacy. Education opens doors for a change in mentality capable of maintaining high sustainability levels. This change should also shift family relations that are culturally and traditionally established in the countryside.

Stela Herschmann recalls that, despite many challenges, there was an increase in the participation of women in leadership roles, when analysing the Agricultural Census. It is noteworthy that the Agricultural Census is self-declaratory. North and Northeast were the two regions that exhibited the greatest increase in the participation of female leaders. “The North, because there were practically no women leading farms before, so any number represents a very large variation. Then the Northeast as well, forming the two standouts when we compare the Agricultural Censuses of 2006 and 2017”, she explains.

Table 2 - MATOPIBA municipalities: schooling of female farm leaders (%)

Regions	No schooling	Incomplete elementary school	Complete elementary school	High school	Higher education
Tocantins	26.8	38.9	2.3	22.5	9.5
Maranhão	29.7	45.8	1.6	18.2	4.6
Piauí	33.3	41.6	1.3	16.8	6.9
Bahia	28.3	44.5	1.9	21.3	4.0
MATOPIBA	29.0	43.5	1.8	19.8	5.9

Source: IBGE (2019).

“Out of the farm gate”: credit and challenges in family succession

“Currently, sustainability has become a business goal. We are collaborating with our commercial team to highlight that sustainability is not a threat. Sustainability can generate business opportunities.”

Thaís Fontes

Thaís Fontes, who works “out of the farm gate”, points out that most of the bank’s customers, not just from MATOPIBA, are men. “There are still only few female customers,” she points out. In the institution, there is a great dialogue and a very special attention in the succession program offered to clients. A follow-up plan includes the training of the next generation that will lead the rural properties. In the countryside, family succession is a highly important issue to understand the dynamics and context of farms. Banking institutions, like Robabank, have directed efforts in this direction.

Small, medium and large agricultural enterprises in the world are predominantly family-owned ⁷. In a family property, there is a greater proximity between the property (owner) and the management (manager). In these cases, the property is the family’s capital, and the producers have the desire to transmit this capital safely and profitably to the next generations ⁸. In the succession of the family business, the owner and the manager are usually the same person. When separating who would be the owner, and who would be the manager, the latter should have some desirable characteristics to manage the agricultural enterprise ⁹. In fact, what predominates in this succes-

7. Lobley, Baker and Whitehead (2010).

8. Hay and Morris (1984).

9. Gasson et al. (1988).

sion process is the desire of the family, especially of the patriarch, to choose who will be the leader among its members (which is also a social position). If on one hand, there is the chosen successor, on the other, there is the young person, who needs to show interest as well. This mutual interest varies greatly: it naturally depends on a wide range of social, economic and cultural conditions that strongly influence the choices of both family and young successors. Even with the increase in the participation of women as managers of agricultural enterprises in the last 20 years, women are still neglected in the succession process. In many cases, they assume the leadership only because of the law - as the owner's wife or only daughter - and under certain social contracts. This process of family succession, if it is not a process established



in advance, can generate conflicts, and result in the “partition of the productive unit” among the heirs, which often implies a loss of scale and efficiency in production¹⁰.

Understanding this family dynamics and property management, Rabobank offers a program, Agrolíderes (“Agrileaders”), which prepares the youth to take over the properties. However, different from what was expected, Fontes reveals that she has noticed an ever-expanding increase in the participation of women. “As much as it is a male-dominated market, we already see a lot of women taking the lead. In fact, some of the farms already have female leaders”.

She highlights that the female presence is remarkable. “My relationship with customers takes place in conversations focused on the topic of sustainability. In these discussions, I see a strong female participation”, explains Fontes.



Rabobank's Agrileaders program
was created almost fifteen years ago.

The program contributes to the training of the new generation of farm leaders, which facilitates the succession in the rural enterprises. Agrileaders has promoted the rise of women as successors in the agricultural projects of many families, despite not being an exclusive program for women. Future female farm leaders receive training and knowledge about the sector, which improves their management skills, and prepares them for a future phase of relationships with brothers and cousins.

10. Alcântara and Machado Filho (2014).

How is it in practice?

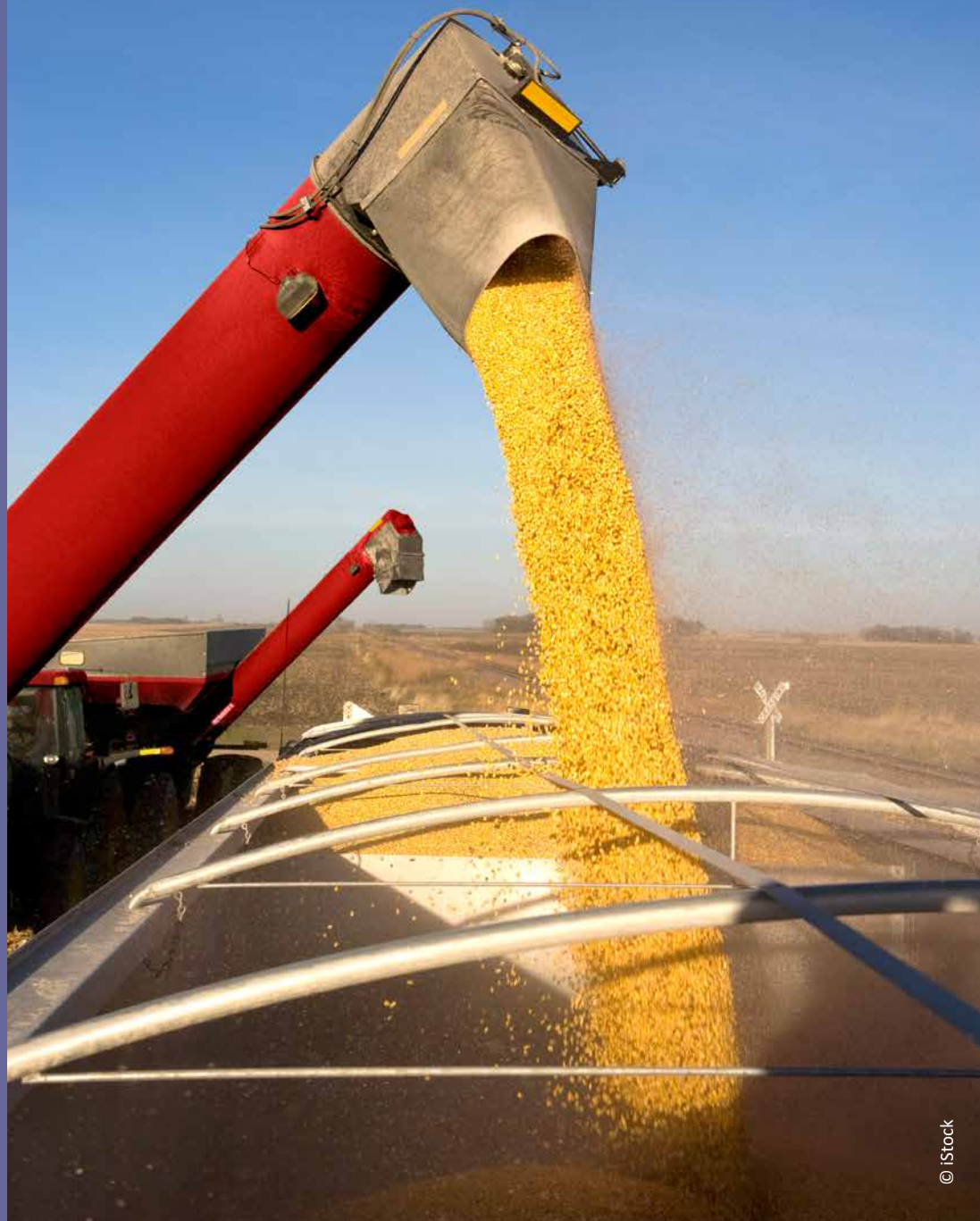
From the moment the bank identifies that a certain property has a person who is taking over, that person is invited to the working group called Agrileaders. This is a program in which qualified people are invited to give lectures and share experiences. Overseas trips are also sponsored, so the participants can understand the agribusiness of other places. Africa, Argentina, Australia and the United States were some of the destinations. The participants then can understand that the agricultural sector goes beyond what is perceived and seen locally. This broadening of vision also contributes to risk mitigation. Each customer must be understood, stimulated and supported individually. For the bank, it is a way to guarantee a long-term relationship with the producer. This long-term relationship requires credit lines, negotiations and identifying what is happening in the property. Succession is highly relevant for the banking institution.

Women have the ability to get where they want to go, and they can be very successful within their role in the business. There are several very cool examples. A customer of ours runs her farm with her daughter. She became a widow and took over the property without knowing anything. Today her farm is an example of a sustainable enterprise that integrates agriculture, livestock and forestry. Her late husband managed the business, but as she took over, she came in without biases and with more desire to make a change. She came without many ties to the past and it turned out to be a success. It is a case of success.



I believe that many women who ended up taking over their family business were not the women who started that activity, but they succeeded in the properties.

Thaís Fontes



CHALLENGES FOR THE FUTURE

Access to credit in Brazil is already a challenge and improvements are always necessary. When we look at the countryside, these challenges are even more poignant. With the data presented in this booklet and the testimonies of our experts, it is clear that a reframing of financial instruments is essential for the Brazilian agricultural sector. Researchers from CPI/PUC-Rio¹¹ point out that there are three directives that deserve attention:

- A process to intensify agricultural production, with the revision of financial instruments to enable an increasing implementation of risk management tools;
- A better alignment between the overarching rural credit policy and the Forest Code, based on the experience of the European Union's Common Agricultural Policy;
- A better designed rural credit system that reduces the clutter of the "entanglement of funding sources and programs, which makes the operation of the system quite costly". Greater participation of private banks could increase efficiency and free up public resources for other areas.

Our work aims to analyse the impacts of the rural credit policies in several aspects such as land use, livestock, agriculture and forest areas. We publish academic papers and extract the main lessons from these studies to discuss with policy makers. We work together with the Ministry of Agriculture, the Ministry of Economy and the Central Bank to align rural credit lines with the Forest Code. We wanted to change the rural credit system so that producers with a validated CAR would have a higher credit limit. That is, producers on a Forest Code compliance route would be rewarded.



11. Assunção and Souza (2018).

In 2020, there was a resolution by the National Monetary Council in this regard. It is very gratifying to be able to contribute to this kind of improvement in public policy.

Priscila Zeraik de Souza

According to a report published by CPI/PUC-Rio¹² in 2020, when there is a greater credit supply, small farmers, who largely represent establishments run by women, increase their productivity. As for the large producers, the offer of credit is intrinsically linked, as well as the small ones, to the increase in production and productivity, “but it is also associated with the expansion of cultivated land and pastures, causing an exacerbation of deforestation”, the document points out.

The challenges are still great to the credit supply system in Brazil.

“Brazil subsidizes rural credit and, therefore, must ensure that society receives benefits from this policy. Offering these resources to small farmers helps family farming, increases production and mitigates adverse impacts on the environment. The targeting of small producers in the coming years aligns subsidies to forest preservation efforts. Medium and large farmers can tap on the non-subsidized credit offered by the banking sector, especially in the context of reduced interest rates in the Brazilian economy in recent years. Other instruments and policies are needed to preserve Brazil’s environmental capital, especially because large producers occupy most of the national agricultural land.”¹³

Another challenge mentioned by the experts is that there are important credit restrictions in the country. “If you have credit available, you have an intensification in production, you can produce more, in terms of both agriculture and livestock, on less land. So, agricultural and livestock production increases and the used area shrinks, mainly because it is possible to intensify production and reduce pasture areas”, Zeraik de Souza explains.

12. Assunção and Souza (2020).

13. Assunção and Souza (2020, p.2).

Readjusting the country's rural credit system along with public policies that promote and monitor the training of girls is an important way to look at the present and work on the change we want for the future. Another important point is to clarify what credit lines are available to rural producers and how farmers can access these financial instruments. The credit supply is essential to promote technological innovation and improvements in the farms. However, this innovation and improvement require policies and incentives that make rural credit effective and efficient.



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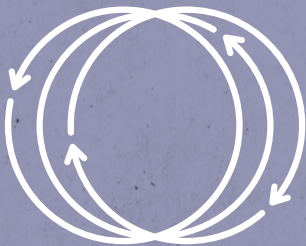
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TECHNOLOGICAL INNOVATION IN AGRICULTURE

Dissemination of technologies that generate increased productivity and better management of natural capital



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GENDER PERSPECTIVES FOR SUSTAINABLE
PRODUCTION IN MATOPIBA

TECHNOLOGICAL INNOVATION IN AGRICULTURE

Dissemination of technologies that generate increased productivity and better management of natural capital

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TRANSLATION

Matheus Sanitá Lima

1st edition

This series of booklets “Gender perspectives for sustainable production in MATOPIBA” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the Brazilian rural environment even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF¹, investigates this intricate scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This booklet brings the theme **Technological Innovation in Agriculture: dissemination of technologies that generate increased productivity and better management of natural capital**. Technology can be seen as a great ally of the entire production process. How does the process of adopting more sustainable technologies take place? What are the goals set internationally? How do these goals impact the adoption of technologies in rural areas? Can women be agents of innovation? These are some of the guiding questions this publication seeks to answer. Throughout this work, the experts **Alessandra Fajardo**, **Janaína Rocha** and **Mariana Vasconcelos** present their perceptions.

Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.



INTRODUCTION

This booklet analyses, from a gender perspective, the use of sustainable technologies in soy production. Talking about technological changes, especially when their impact directly influences the modes of production, is a great challenge for Brazilian agriculture. Based on the experts' narratives, the main milestones in favor of sustainable agricultural practices are presented. Some ways to leverage the adoption of technological innovations in rural areas are discussed along with changes that have already happened in the countryside. These changes show that it is possible to produce sustainable soy. This booklet also presents the role of women as agents of innovation. The entire narrative is told through the voices of the consulted experts. Their perception is the thread running through this small but important part of history.

The Covid-19 pandemic posed great challenges for this production. However, technology, so mentioned in rural areas as a way to improve processes in the field, was also a strong ally in the elaboration of this series. Analyses of official data combined with online interviews shed light on women who fight to have technology as a strong ally in the production of sustainable soy in the MATOPIBA and elsewhere.



ALESSANDRA FAJARDO

An agronomist from the “Luiz de Queiroz” School of Agriculture of the University of São Paulo (Esalq/USP), Alessandra started her career already in the Cerrado. In 2009, she joined Bayer in “market access” at the seeds and biotechnology division.

She is currently a member of Bayer’s Public Policy and Sustainability Division and is responsible for the engagement of stakeholders on agriculture and environment. Alessandra is Bayer’s institutional relations leader for Latin America.

A forestry engineer from the University of Brasília (UnB), Janaina holds a master’s degree in Tropical Forest Science from the National Institute of Amazonian Research (INPA). She is a specialist in Information Systems for Biodiversity by the Japan International Cooperation Agency (JICA). Since 2010, she has participated in the elaboration of the National Rural Environmental Registry System (SICAR), having acted as executive manager during the implementation of the system in the country. She has worked with the Amazonas State Government and the Brazilian Forest Service (SFB).

JANAÍNA ROCHA



MARIANA VASCONCELOS

Daughter of rural producers, she has the blood that moves the rural environment in Brazil running in her veins. With a degree in Business Administration, she understood that she could offer technology to what her family has always done, connecting two worlds that may seem so different but are very complementary. Born in Itajubá, Minas Gerais, Mariana is the founder of Agrosmart, one of the main agritechs in Brazil and Latin America. She was elected by the Massachusetts Institute of Technology (MIT) as one of the most innovative young people in the world under 35 years old. She is considered one of the 100 most influential people in agribusiness in Brazil by “Dinheiro Rural” magazine.



TECHNOLOGICAL REVOLUTION IN THE FIELD

The Green Revolution was a worldwide post-war movement that intensified from the 1960s onwards. The movement introduced high-yielding seed varieties initially into developing countries that had chronic production problems and famine. These seeds were produced in genetic improvement centers and were financed by several multilateral institutions. The impact of this genetic revolution was so expressive that other countries also started to adopt it along with new technological packages for crops, with new pesticides and fertilizers². In Brazil, the impact of the Green Revolution was more expressive from the 70s, specifically after the foundation of the Brazilian Agricultural Research Corporation (Embrapa³) in 1973. This entire campaign to increase productivity in Brazil was called agricultural modernization. Embrapa adapted new varieties of modern inputs according to the climatic and soil conditions of different Brazilian regions. Among all the cultures surveyed, soybean was the one that stood out in this first stage. Its adaptation and genetic improvement allowed its expansion from the South to the Midwest and to several biomes. Soy was also one of those responsible for the rapid expansion of agricultural frontiers⁴.

For Alessandra Fajardo, the rural technological process is important. Currently, there is an innovation customization revolution in the field, and it is increasingly necessary to ensure a balance of resources that strive for efficiency. According to Fajardo, the rural producer can be more assertive in the amount of fertilizer the soil really needs, or be more precise at the right time to control a crop pest. Data-driven decisions that generate savings, promote efficiency, and contribute to more sustainable agriculture.

Technology, in the view of the consulted experts, should be offered to everyone in an unrestricted and broad way. For them, the so-called Agriculture 4.0 brings the possibility of customization. That means the producer can work with what the property really needs, with what is most recommended for their

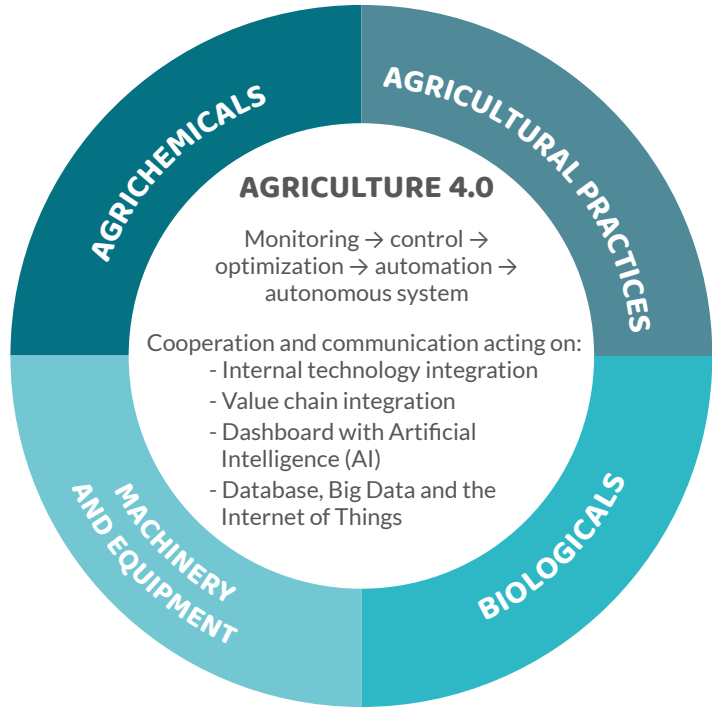
2. Pingali (2012).

3. Translator's note: EMBRAPA stands for "Empresa Brasileira de Pesquisa Agropecuária". A suitable translation would be "Brazilian Agricultural Research Corporation".

4. Bonelli and Pessoa (1998); Diniz (1995).

region. “When I talk about Agriculture 4.0, I wish there were a cell phone antenna everywhere, because it would be much easier to access and transfer this technology. The industry has been investing for years in training... But there are very small farmers who are not reached. This dissemination is the challenge in terms of training for good practices, as the technological part, the structure of the technology, is still limited. Producers need to have access to this structure so that it is easier to access the resources that companies have to spend”, Fajardo highlights.

Figure 1 - Technologies 4.0



Source: ECOconsult.

For Mariana Vasconcelos, sustainability is no longer something like “embracing a tree” but rather a practical application and understanding, because “in addition to being better for the planet and the environment, technology also makes more money. I will be able to sell for a better price and enter more competitive markets”, she argues.

HOW TO IMPROVE TECHNOLOGICAL INNOVATION IN THE RURAL ENVIRONMENT?

“Technological innovation can bring, both for decision-makers and rural producers, possibilities to deal with planning and data in a more efficient way.”

Janaína Rocha

As in the process of modernization of the Brazilian agriculture, there are many reasons that lead rural producers to adopt technologies, among which, notably, the possibility of making a better profit. Market signals guided and leveraged the adoption of technologies in the modernization process of agriculture in Brazil in the 70s. These market signals could be translated as follows: monetary credit was saved, which was expensive and practically non-existent; on the other hand, the most abundant and cheapest factor was used more intensively, that is, land and labor⁵. Subsidized rural credit for some products came into the scene, which intensified the use of machinery and equipment. The subsidies were directed to the adoption of modern inputs (seeds, pesticides and fertilizers), in addition to encouraging the replacement of native vegetation by crops of soy, corn, rice and wheat – more frequent in the south of the country. Booklet 3 discusses in more detail the dynamics of credit available to farmers.

In Brazil, the modernization process promoted by means of rural credit with public resources was fundamental for the development of the sector. The dissemination of technologies was carried out by the state technical assistance and rural extension companies (ATER⁶), later with the participation of cooper-

5. Schultz (1965); Hayami and Ruttan (1988).

6. Translator's note: “Technical Assistance and Rural Extension” services are referred as ATER in Brazil. Through these services, public and private institutions provide producers with trainings, field excursions and even equipment and inputs. “Rural Extension” could be translated to “Rural Outreach”.

atives and private companies that disseminated further technology to farmers. Most producers passively adopted technological packages through the acquisition of modern inputs, such as seeds, fertilizers and pesticides. Thus, these packages simplified the way to produce and started to create a certain pattern, predominant in several Brazilian regions.

Technology and sustainability

Increased efficiency in agricultural production leads to high levels of sustainability, based on the environmental, economic and social tripod.

Efficiency based on this tripod increases profit margins not only in the short term, but fundamentally in the medium and long term.

Sustainable technologies bring production in line with the most demanding markets, which are willing to pay an additional price for increasing levels of sustainability on rural properties.

The prices of inputs and agricultural commodities, such as soy, are determined by the market. Therefore, efficiency is directly proportional to technology adoption.

Agrichemicals: fertilizers and phytosanitary products

Machinery and equipment: harvesters, planters, sprayers

Biological: seeds, nutrition, phytosanitary defense

Agricultural practices:

- conservation of soil, water and protected areas
- carbon emission reduction
- intensification of livestock and agricultural production
- recovery of protected and degraded areas
- no-till farming
- integrated production systems
 - » crop-livestock
 - » crop-forest
 - » livestock-forest
 - » crop-livestock-forest

In the 90's, there was a new cycle of technological innovation, with the introduction of machinery and equipment that started to replace human labor. Several tasks that were performed until then by seasonal workers – also called “bóias-frias⁷” – started to be done mechanically, and no longer manually. These technologies were developed especially for monocultures cultivated in the tropical zone of the planet. The sugarcane harvester is one of the most expressive examples of this new innovative cycle, as it changed the configuration of the production of this crop. Automatization eventually reached other crops, such as coffee, oranges and cassava⁸.

In the same decade, the environmental issue began to have repercussions in all spheres of society, especially after the United Nations Conference on Environment and Development, also known as Eco-92, the Earth Summit. It was necessary to rethink the predominant production systems in agriculture, which were based on the intensive use of agrichemicals and the management of natural resources. For Brazil, Eco-92 was very important. After the Summit, research institutions and many civil society forums intensified questions about the current production model and, simultaneously, joined efforts in favor of agroecological alternatives and technologies that mitigate impacts on the environment. At that same time, the institutional conditions for the cultivation of genetically modified seeds - transgenic seeds, or genetically modified organisms (GMOs) were created. In Brazil, GMOs were introduced in 1995, with a provisional biosafety measure. Only with the Law No. 11.105, of March 24th, 2005, the Federal Government established clear safety standards and inspection mechanisms for any activity involving GMOs in the country. This law became known as the Biosafety Law. The legalization of the planting of genetically modified cultivars for the main crops had the following sequence: soybeans in 2003, cotton in 2005 and corn in 2008.

At the beginning of the first years of the current century, Embrapa implemented extremely important programs to control factors for the planning of the national production – land occupation and use. They are: i) Agritempo, to indicate the agroclimatic zoning; and ii) geospatial tools, to manage land and socio-

7. Translator's note: “bóias-frias” literally translates to “cold lunchbox”. The term refers to rural workers that leave their homes early in the morning and bring their lunch to work. When they eventually have a chance to eat, their food is already cold.

8. Stduto, Shikida and Bacha (2004).



economic characteristics. Embrapa also continued with the constant process of improving techniques and developing new cultivars. These advances allied with an international market eager for agricultural commodities, particularly soy, contributed to the expansion of a new agricultural frontier towards the MATOPIBA (MAranhão, TOcantins, Plauí and BAhia). The expansion of cultivated areas relied on the adoption of precision farming practices, in order to increase the efficiency in the use of resources.

Fajardo talks about the importance of seeking the customization of inputs to meet the different demands for different properties. The expert warns that one cannot use the best technological package without an assessment of the land and suitability of that property. “With more data available in a more accessible way to make decisions, producers are able to manage their crops so that they can have more and better results using the same production area. Agriculture 4.0 brings tools that give the producer conditions to

manage each hectare. The producer can make decisions taking into account the efficient use of inputs and natural resources”, the expert explains. She adds that the most efficient choice starts “with the fertilizer, the seed and the entire crop cycle”.

Another point highlighted by Mariana Vasconcelos is the speed with which these technological changes effectively impact the rural environment.

“The learning process is normal in the journey of digital transformation. I’m going to use one technology first, I’m going to mature it, and then I’m going to go to another one. Because of risk aversion itself, I’m going to test it first. If it works, I will effectively adopt the technology. This is something that does not happen quickly, even when there is a return on investment, because it involves a change in behavior, education, training, in addition to involving all employees.”



Mariana Vasconcelos

In 1997, sustainable production had another boost when 84 countries were willing to adhere to the Kyoto Protocol, which proposed goals for reducing greenhouse gases (GHGs)⁹. Based on the principles of the 1992 United Nations (UN) treaty on climate change, the protocol adopted different levels of GHG emission reduction for signatory countries. Despite being a developing country, and therefore not obligated to follow the recommended targets, Brazil not only actively participated in the conference’s decision-making, but also assumed a commitment to reduce emissions. Brazil understood that it could contribute because it was a major player in the world market for agricultural products. The countries that signed the protocol now have a clearer structure for buying and selling carbon credits.

⁹. Brochure 2 of this series discusses low-carbon agriculture and presents the challenges and future prospects of this technology.

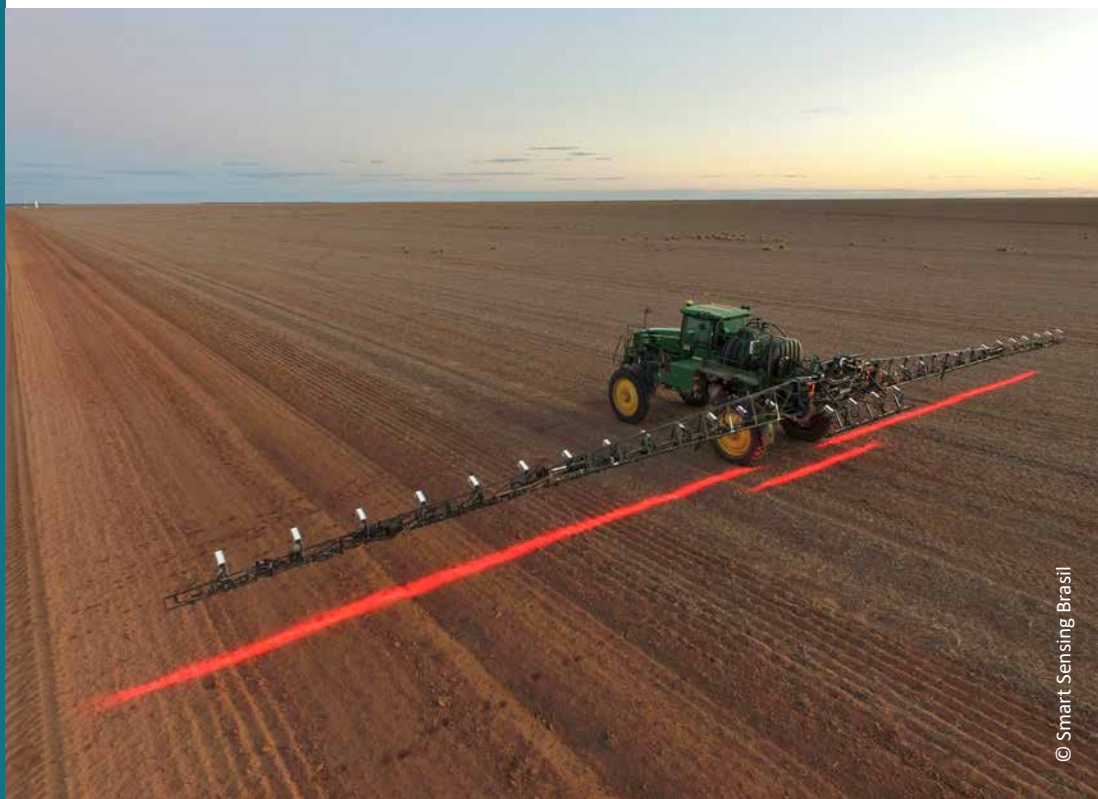
In addition to the UN initiatives, the 90's were also marked by several initiatives that promoted the adoption of agricultural technologies and practices for a more sustainable production - practices that were able to mitigate the negative effects of extensive cultivation of the main monocultures. One of these practices was the integrated pest management (IPM), which aims to manage the crop so that plants can express their natural resistance to pests and pathogens and can be protected by beneficial organisms. IPM combines several control methods and takes into account the cost of production and the impact on the environment, reducing the use of agrichemicals as much as possible. Adopting IPM favors the use of non-chemical or alternative methods, such as pheromones, biopesticides, eradication of alternative hosts and the removal or burning of affected plant parts¹⁰.

Also in the 90s, the popularization of soil conservation techniques, such as contour farming, began. Although these techniques have been known for a long time, they started to be disseminated among producers once again. Contour farming reduces soil erosion caused by the runoff of rainwater, through the creation of small barriers (small terraces). Another system that started to be adopted more frequently in several regions of Brazil was no-till farming. This was the great innovation in soil management and conservation in monoculture areas, and remains today as one of the most adopted management techniques in seasonal crops in Brazil. In addition to reducing CO₂ emissions, by reducing the use of tractors, no-till farming contributes to the biological quality of the soil, which ensures the maintenance of high production rates in the long term.

After the Kyoto Protocol, other events organized by the UN also served as a framework for mitigating impacts on climate change. Among them, the Copenhagen Conference in 2009 (COP15), Rio+20 in 2012, and the Paris Agreement in 2015. GHG emission targets were also the central theme of the European Green Deal, which established an ambitious emissions reduction agenda in 2019. The Green Deal's proposal is to make Europe the first climate-neutral continent in the world by 2050¹¹. There is an increasingly strong movement in favor of the adoption of more sustainable practices, but the biggest chal-

10. Crocorno (1990).

11. Brasil (2012); Gurgel and Laurenzana (2016).

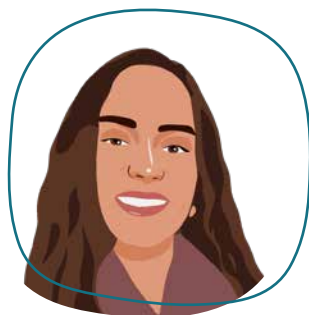


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lenge is still the mobilization of different sectors and countries, with clear and achievable objectives for different realities.

“New things are popping up all the time. A lot of technological innovation is available nowadays in the world and in our country. We need to study, and especially listen, so that we, society or our productive area, can choose and not be ‘hostage’ to the imposition of just one technology.”

Janaína Rocha



CHANGE OF PERSPECTIVE IN SOY PRODUCTION

Historically, soy has always seemed to be a counterpoint to a sustainable production model. Booklet 2 of this series, which discusses such duality, also presents the history and challenges of low-carbon practices for this crop. Despite being such a powerful grain and with so much potential to innovate, soy production is often confused with a more traditional agriculture, with the intensive use of agrichemicals in a more extensive production model. What has happened in recent years is the demystification of the production of soy and now it is possible to conceive the idea of sustainable soy. The rural producer already applies no-till farming, precision agriculture, and, as it is a large-scale production system, they also demand state-of-the-art technologies. “When I use a technology that gives me visibility and allows me to better allocate the resources of my property, I manage to be more sustainable. This is the case with the crop-livestock-forest integration, regenerative agriculture, organic soy and its consequent generation of carbon credit”, Mariana Vasconcelos explains.

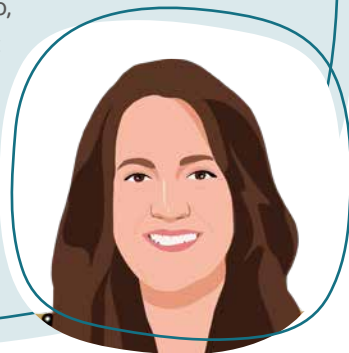
What the experts observe is that there has been a major transformation in the field. Producers’ resistance to change has diminished, so has the market perception that there are only two rigid agricultural models: one for soy and another for smaller crops. “Most producers are committed to environmental preservation, in the correct way, because they want to export and they know that there is value if they produce in a sustainable way”, Vasconcelos highlights.

For her, when the impact of technology reached the soy, there was certainty of a more consistent movement. “We are moving towards a Brazil that produces more, after all, we have the responsibility to feed the world. It is a big responsibility. You cannot do this if it is not in a sustainable way. The market understood it! The producer and the industry understood it as well”, she believes.

Innovative actions in practice

"Bayer has a very aggressive commitment to sustainability with clear goals, which must be fully implemented by 2030. We call them 30-30-100 and they are global. The first goal is to reduce GHG emissions in agriculture as a whole by 30% in countries where Bayer operates. The other is to reduce the environmental impact of our chemical portfolios by 30%. We also want to improve the lives of 100 million small farmers around the world, which has a far greater impact in Asia and Latin America. This project includes countries such as Mexico, Colombia, Peru and smaller countries, but it will also take place in Brazil. These three actions are part of the Crop Science division; at the Bayer group, the goal is to zero our emissions by 2030."

Alessandra Fajardo



RECEPTIVENESS OF PRODUCERS TOWARDS A SUSTAINABLE PATH

"We begin to see a shift in that perception of: 'either I have nature or I have agriculture'. More and more farmers understand the benefit of the coexistence of good practices with the environment"

Alessandra Fajardo

Brazil has consolidated technical knowledge and successful experiences on a commercial scale in productive systems with greater resilience and productivity. More diversified agricultural systems will have greater ecosystem functions (Booklets 1 and 9 of this series deal, respectively, with environmental regularization of rural properties and Payments for Environmental Services) and higher levels of ecological and economic resilience. Integrated systems optimize resources, save land and are less susceptible to climate variations. Therefore, they also generate greater added value¹².

Innovation occurs when technology is disseminated to all agents, therefore, when knowledge is shared. However, this process encounters barriers, and one of them is related to gender differences¹³. Prejudice and discrimination affect interaction and cooperation between stakeholders throughout the production process. Men more commonly use the gender hierarchy (which normalizes the position of men ahead of women) to impose their ideas without debating within the team, without listening to what other members think about the subject and without accepting that ideas from other members may be more effective. Women are equally capable of coming up with creative ideas and solutions. However, women need to prove their ideas are good and worthy more often. Vasconcelos explains what it is like to deal with these situations in an environment like the countryside, which is predominantly male and culturally sexist.



"It's a historic issue and a challenge to change our mindset. We still have few women in the countryside, but I realize that, in the last three years, this movement for change has become very strong. Many women decided to take a step forward and say no: I'm the one who decides, I'm the one who does the agribusiness! And a support network was created that I consider a very important movement. I see much more interest, engagement and participation of women in agriculture as a whole, both in the industry and on the properties."

Mariana Vasconcelos

12. Assad et al. (2019).

13. Riege (2005).

Much is said about the resistance of most producers to adopt sustainable agricultural practices and new technologies. In fact, there are many reasons that make them afraid to innovate in their properties. But, for each case of great resistance, there are many examples of people who innovate and show how adequate soil management, combined with integrated systems and the use of efficient technologies, enables the increase of income and productivity. This also always reduce the pressure to open new areas, which greatly combats illegal deforestation. The world is just one and its resources are finite. In the end of this technological and innovative process, there is the fundamental role of women. In the elaboration of this series of booklets, it has become clear that women have decisive contributions to the innovation and development of the cultures planted in MATOPIBA. This is also what the consulted experts see.

"Companies like Bayer, where I work, are increasingly encouraging the participation of women. We even have a program for this, whether internally in the leadership, or in hiring, at the base, so that women can grow. The CEO of Crop Science in Brazil is a woman. This shows the commitment to have women reach top leadership positions."



Alessandra Fajardo



"The producer is not always ready for innovation."

Mariana Vasconcelos

For change to happen, one must be ready for it. While it may seem like a simple and obvious thought, when it comes to rural innovation, changing means investing money, time and work to reap the fruits of the decision. For the producer, working differently than usual is also increasing the risk, it is betting on the unknown. For this reason, the first phase of implementing a new technology is through experimental areas within the farm itself. In some cases, the producers perceive that “it had an effect, and the technology is very good, but the cost of operational change [when applying it to the entire property] is so high, that this influences all other processes”, Mariana Vasconcelos emphasizes. Changing an operation and adding more technological procedures, or a new sustainable agricultural technology, are quite complex processes. Generally, producers end up keeping this new knowledge in small portions of their property, in experimental areas. After all, changing what has been working is much more laborious and may not bring profit, at least in the short and medium term. It is also difficult to account for the legacy left to the environment and natural resources of the property, when comparing traditional systems with modern, integrated and sustainable models. Booklet 7 of this series discusses the management of natural capital in rural properties.



Mariana recalls that, there were several customers who terminated the contracts with her company in the beginning. In some cases, they felt they weren't ready to innovate; in others, she was also learning to understand what her client wanted. "I see a maturation in the industry on both sides: we started with a technology that was improving, which was advancing with the entry of new products. We know that we lost customers in the past because of mistakes that were limiting in terms of technology at the time. However, we were approached after a few years by some clients who wanted to retake the contract. Some customers recognized that their internal processes and their team were not ready to receive all that information and that now was a better time to try again and start the whole process over", the expert explains. "Actually, it is difficult for a producer to fail with our technology only. The producer first thinks the company is to blame. Later, when they try other companies, they realize that these other companies are not bringing a change either. So, they start to reflect and conclude that maybe there really is a procedural problem in the farm itself", she says.

THE ROLE OF WOMEN AS AN AGENT OF INNOVATION

"When women realize their ability to learn, they also realize their potential to contribute in the management."

Janaína Rocha

Fajardo adds another challenging aspect in the process of change, which is to accompany the cultural transformation of female protagonism and the size of the property itself. "When the property is smaller, women are absolutely needed. It's easier to get women to do the work, because the male farmer cannot handle it alone. Usually, the small producers do not have the resources to have

a manager per se and, therefore, women jump in the administrative role in the property”, the specialist explains.

Fajardo’s perception is confirmed by data from the last two agricultural censuses. From 2006 to 2017, the participation of women as managers of agricultural establishments increased significantly, and the group that grew the most was small producers or family farmers¹⁴. After taking a more administrative role, women begin to understand all phases of the process and thus participate in decision making and empower themselves. Mariana Vasconcelos considers, however, that what the records show does not always reflect reality. “Rural production is often identified by the Register of Individuals (CPF¹⁵). But the farm can use the wife’s CPF, for example, and she does not own the property: she does not manage, command or make the decisions”, the expert reports.

Fajardo remembers yet another situation. “Once, talking to a farmer in Mato Grosso, he said to me: ‘My wife is studying agronomic sciences to help me, because I have my farm and I’m a consultant, but I cannot do both and the farm is tiny”, Alessandra recalls. She believes that it is often necessity that brings women to occupy management roles within the rural family business. “We have cases of women who became managers in non-ideal circumstances and were successful. These properties come in all sizes,” she says.

The experiences of the consulted experts show the different realities of the rural environment. Regardless of whether women are protagonists or part of the team, what is clear is the importance of women in the production process, including when pushing for the adoption of more sustainable technologies.

***“Necessity brings women
into the property.”***

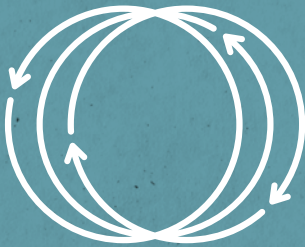
Alessandra Fajardo

14. IBGE (2019).

15. Translator’s note: CPF literally translates to “Physical Person Registry”. That is Brazil’s individual registration system mostly used for financial and fiscal operations.

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GOOD GROWTH PARTNERSHIP





RESPONSIBLE SOY EXPANSION

Feasible alternatives for the increase of
agricultural production in consolidated areas



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Brasil

GENDER PERSPECTIVES FOR SUSTAINABLE
PRODUCTION IN MATOPIBA

RESPONSIBLE SOY EXPANSION

Feasible alternatives for the increase of
agricultural production in consolidated areas

Brasília/DF, 2021

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TRANSLATION

Matheus Sanitá Lima

1st edition

This series of booklets “Gender perspectives for sustainable production in MATOPIBA” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the Brazilian rural environment even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF¹ -, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This booklet discusses the theme **Responsible Soy Expansion: feasible alternatives for the growth of agricultural production in consolidated areas**. Soy is the main product of the Brazilian agricultural sector and one of the most common crops in agricultural frontiers. What are the dynamics of sustainable soy production in MATOPIBA? Is it possible to expand production only using degraded pastures, without moving to areas of native vegetation? How to value women's space on rural properties in the region? These are some of the guiding questions this work seeks to answer. The experts **Aline Leão**, **Caroline Rolim**, **Flávia Pinto** and **Jane Lino** share their perspectives and contribute to this publication.

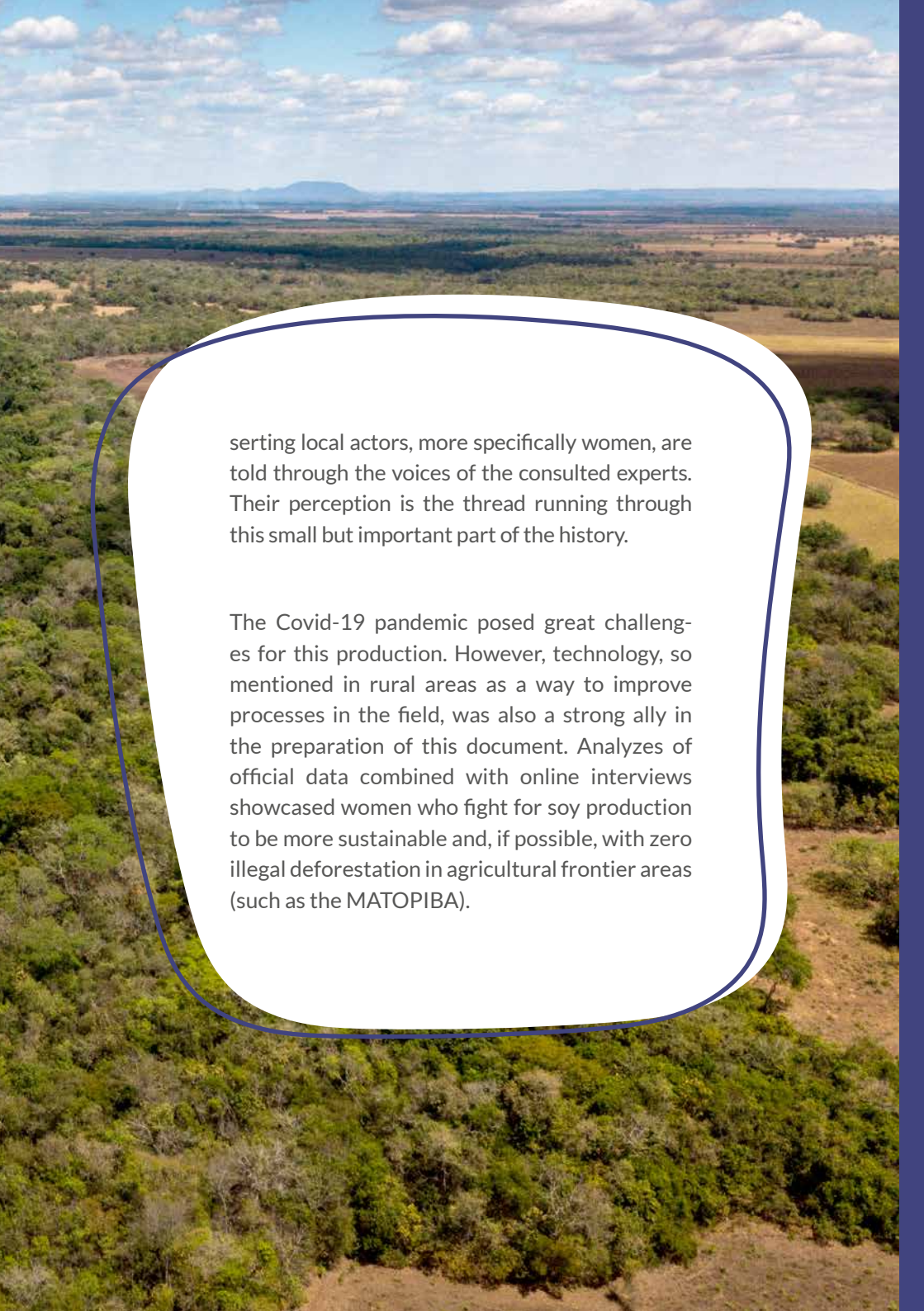
Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.



INTRODUCTION

This booklet seeks to analyse the dynamics of responsible soy expansion from a gender perspective. Talking about this expansion is a great challenge for Brazilian agriculture. Based on the experts' narratives, the main themes associated with the sustainable production of soy and the expansion of production in consolidated areas are presented. Strategies to encourage the production of soy with zero deforestation and conversion (ZDC) in degraded pasture areas of MATOPIBA (MAranhão, TOcantins, Plauí and Bahia) are discussed. Increasing the sustainability of soy production has become a commitment across the entire production chain; and the difficulties in in-

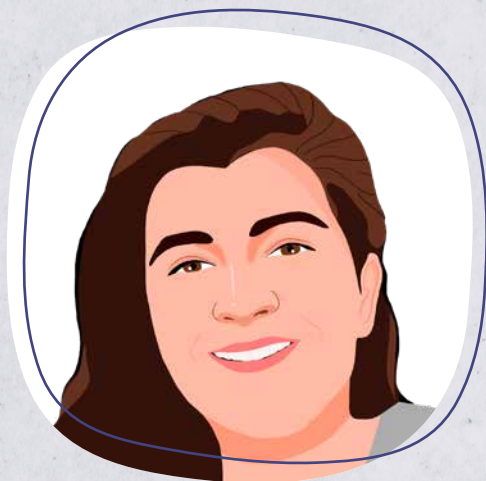


serting local actors, more specifically women, are told through the voices of the consulted experts. Their perception is the thread running through this small but important part of the history.

The Covid-19 pandemic posed great challenges for this production. However, technology, so mentioned in rural areas as a way to improve processes in the field, was also a strong ally in the preparation of this document. Analyzes of official data combined with online interviews showcased women who fight for soy production to be more sustainable and, if possible, with zero illegal deforestation in agricultural frontier areas (such as the MATOPIBA).

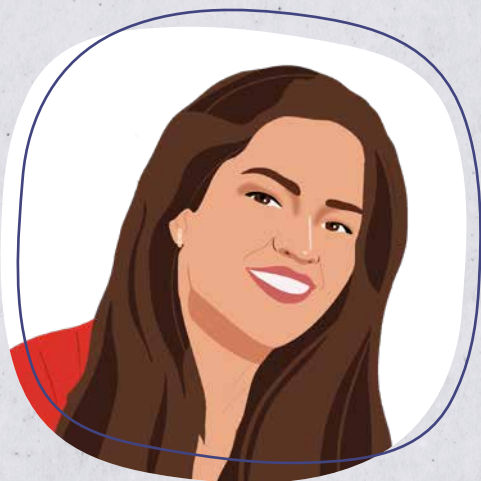
ALINE LEÃO

An environmental engineer from the Catholic University of Brasília (UCB), specialist in Sustainable Architectural and Urban Environmental Rehabilitation, with a focus on water resources, from the University of Brasília (UnB), Aline is a specialist in conservation and geoprocessing at The Nature Conservancy (TNC). She has been working at TNC since 2011 with the development of sustainable agriculture in the Cerrado.



CAROLINE ROLIM

Graduated in Business Administration from Fundação Getulio Vargas (FGV), with a master's degree in Sustainability from the same institution, Caroline specializes in the sustainable production of commodities. She currently is the sustainability coordinator at Cargill.



FLÁVIA PINTO

Biologist from the University of Brasília (UnB), with a doctorate in Ecology of Tropical Ecosystems from the Rio de Janeiro Botanical Garden Research Institute (JBRJ) and specialization in Geoprocessing from UnB, Flávia focused her career on the effects of climate change and land use on biodiversity and its interactions. She currently coordinates the development of the Agroideal platform at The Nature Conservancy (TNC).



JANE LINO

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SOYBEAN: FROM ASIA TO THE SPOTLIGHT IN BRAZILIAN AGRIBUSINESS



"The expansion of soy in the MATOPIBA region is recent, and soy is often the first major agricultural production cycle that some municipalities in this region are observing."

Jane Lino

Soy currently is the main Brazilian commodity and already has a strong presence in MATOPIBA. In the last decade alone, the production of this grain reached more than 14 million tons in the region. Most of this soy comes from medium and large properties, that deploy mechanization in most stages of production in the best and largest areas of Brazil.

Because soy is a highly demanded grain in the international market, soy production has been growing in several regions of Brazil, mainly in the agricultural frontier areas of the Center-North. The expansion in these areas was very dynamic in the late 20th century. There was also a strong impact even in the Amazon, where stricter regulations limit (legal) deforestation and land use.

In the 2019-2020 harvest, Brazil produced approximately 124 million tons², or almost a third of the volume of world production (31.3%). In addition to being the largest producer, Brazil is also the largest exporter of soybeans, with

2. Conab (2021).

3. Available at: <https://comexstat.mdic.gov.br/pt/home>.

45% of international trade, totaling approximately US\$28.6 billion in 2020³. The total area of soybean production in Brazil reached almost 37 million hectares in 2019/2020⁴ and the Cerrado has been accounting for about half of the planted area.

In the global context, agricultural commodities are largely produced in tropical regions, where there are large productive areas and potential to transform degraded fields into productive ones. More than just supplying the international market, producing countries are now required, mostly by countries of the Northern Hemisphere, particularly the EU, to increase sustainability across their production chains.

"In most cases, there is a gap between the consumer in Europe, who wants a soybean without any deforestation, and the producer, here in Brazil, who sees deforestation as a legal right, as part of the 'development' of an area. Aligning these visions is necessary and involves revising the role of native vegetation in agricultural production."



Jane Lino

Many studies have evaluated the intensity of land use in Brazil, especially for farming activities. A 2019 study by The Nature Conservancy (TNC)⁵ pointed out that there were more than 18.5 million hectares of pasture suitable for soy production in the Cerrado. This number corresponds to more than double the amount of 7.3 million hectares needed to ensure increased grain production in the Cerrado without deforesting native vegetation. The idea proposed by TNC was to use underutilized pasture areas with agricultural aptitude: a combination of actions to support the intensification of cattle raising, freeing up low-productivity pasture areas, and encouraging the conversion of these

4. Conab (2021).

5. TNC (2019).

underutilized areas for grain production. In addition to not deforesting, the expansion of soy into existing pasture lands has less implementation cost and higher productivity than converting areas of native vegetation into cultivation areas – it is three times faster to reach maximum crop yield on already established pasture lands.

In MATOPIBA, more than 80% of the expansion of soy in the last two decades occurred on native vegetation⁶. The region is home to the most significant remnants of Cerrado on private land suitable for soy production, comprising 45% of the Cerrado's surplus legal reserve, which represents 4.5 million hectares.

However, the expansion of the agricultural frontier, replacing native vegetation with agricultural activities, has provoked reactions in some markets.

6. TNC (2019).



“Many of our consumers in Europe demand a sustainable product, a product that originates, at least, in terms of compliance with the environmental legislation in force in Brazil”, argues the Brazilian Association of Vegetable Oil Industries (Abiove), in an interview with the Canal Rural in 2020⁷. Abiove states that 50% of the soy meal sold by its member companies is shipped to the European continent. The market value of the product totaled 8 billion dollars in 2020.

For Proforest specialist, Jane Lino, there is a big challenge for companies that are embedded in the dynamics of the soy production chain: to know the origin of the production. “Only few companies focus on this initial part of the chain, which is the direct purchase from the producer”, she explains. There is, therefore, a great job ahead, which consists of mapping the entire chain to clearly visualize the origin of this soy. In addition to transparency in the relationship with the consumer of this grain, mapping is also essential to understand a little more about the risks. “Understanding where the risks are greatest helps the company to prioritize. It is not possible to engage all producers at the same time when there are traders who have thousands of producers linked to their chain”, Lino points out.

Talking about soy production is talking about the Cerrado

Soy is present in almost all Brazilian biomes, but it is in the Cerrado that most of the production is located. Cerrado is the second largest biome in Brazil and Latin America, covering twelve Brazilian states - Goiás, Mato Grosso, Mato Grosso do Sul, Tocantins, Minas Gerais, Bahia, Maranhão, Piauí, Rondônia, Paraná, São Paulo and Federal District. This biome is (partially) present in three other states - Amapá, Amazonas and Roraima - in addition to existing in northeastern Paraguay and eastern Bolivia.

With its dry climate and its vegetation similar to savannas, Cerrado was forgotten for a long time, as it was considered to have low potential for agricultural development. However, from the 70s onwards, this view changed.

Because of the depletion of land available for agricultural exploitation in the

7. Available at: <https://bit.ly/2XdIVKO>.

South and Southeast regions and the increase in international demand for soy, Brazil started to look for alternatives for the expansion of its agricultural frontiers. And it succeeded. Although soybean cultivars are characteristic of temperate climates, in the 1980s, the Brazilian Agricultural Research Corporation (Cerrados Unit) launched the first variety adapted to the Cerrado. The modernization of agriculture combined with public campaigns, national entrepreneurs and foreign capital were great allies for the rapid expansion of this last productive frontier.

The previously verified inaptitude of the biome was overcome, and the Cerrado region became strategic in the incorporation of new agricultural areas. Its geographic position and its physical-environmental characteristics began to demand an expansion of agricultural production based on the intensive use of inputs – pesticides, fertilizers, machinery and equipment. In a short time, the region became one of the most important agricultural production centers in the country, with public policies aimed at expanding the agricultural frontier⁸.

Among the main programs that promoted increase in production and productivity of the agriculture practiced in the Cerrado, the following stand out: the Japanese-Brazilian Cooperation Program for the Development of the Cerrados (Prodecerr); and the Cerrados Development Program (Polocentro). Embrapa⁹, responsible for the generation of agricultural technologies with several national research centers, particularly the Cerrados Agricultural Research Center (CPAC), currently known as Embrapa Cerrados, played a fundamental role in the transformations that took place in the region and in the recognition of the Cerrado as a strategic biome for environmental policies.

“The Cerrado also acts as a carbon sink, playing a crucial role in the global effort against climate change. Scientists have shown that deforestation of native vegetation is already increasing local temperature, altering precipitation patterns and negatively affecting soy productivity¹⁰.”

8. Silva (2000).

9. Translator’s note: EMBRAPA stands for “Empresa Brasileira de Pesquisa Agropecuária”. A suitable translation would be “Brazilian Agricultural Research Corporation”.

10. TNC (2019, p. 2).

As presented by TNC¹¹, the deforestation cycle can be interrupted in the Cerrado through the conversion of low productivity pasture areas into soybean cultivation zones. The institution's proposal is not to stop producing soy, but to stop opening new areas of native vegetation.

SUSTAINABLE SOYBEAN PRODUCTION

Experts Jane, Aline, Caroline and Flávia, consulted for this booklet, point out that the great risks of soy are in the production, which has a very complex chain, with several logistical issues involved. The quest for a responsible soy production starts with ensuring that buyers support producers in adopting more sustainable practices. The companies that buy soy should also have effective monitoring and evaluation mechanisms. "This, being cascaded along the chain, reaches the level of production, usually through traders, who are buying directly from the producer," Lino says.

The price to build this sustainable production chain is high and, policies and incentives not always provide the best environment for rural producers. The financial returns from converting pastures to soy crops are more favorable than converting native vegetation to agricultural land. However, the low prices of land with "standing" native vegetation end up making the opening of new areas more attractive. This scenario is challenging to achieve one of the alternatives for soy production in Brazil: zero deforestation and conversion (ZDC), according to a study by TNC¹². "The peak of production of soy cultivated on former pasture areas can be reached much faster than producing on areas of recently deforested native vegetation. This difference contributes to a rapid financial return", the 2019 study defends.¹¹

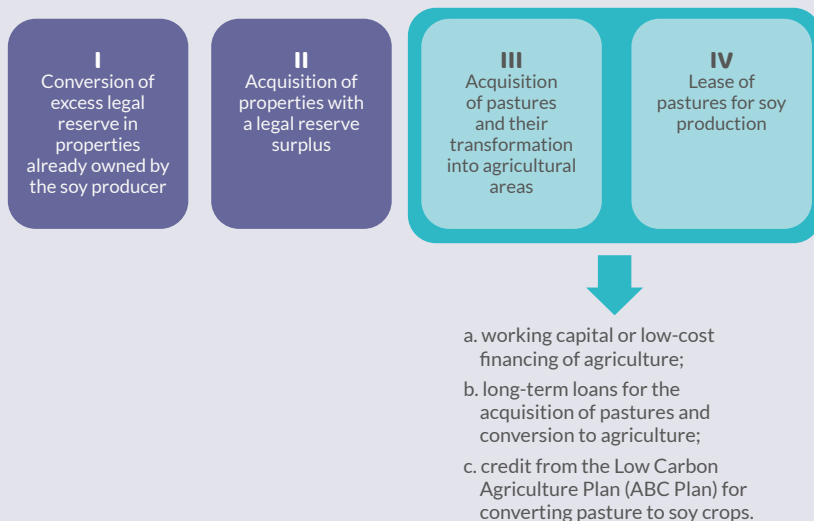
In fact, financial incentives through specific credit lines can make the expansion of soy without deforestation more attractive than the expansion of soy on acquired land that allows for legal deforestation (that is, areas in compliance with the Forest Code).

11. TNC (2019).

12. TNC (2019).

What are the most used models of soy expansion¹³

In the publication *Incentive for Sustainable Soy Production*, TNC presents four models of soy expansion identified in Brazil.



According to the institution, in the last decade, 61% of the expansion of soy in the Cerrado took place in pasture areas, which indicates that the rural properties in the region, for the most part, have adopted sustainable land use practices. The institution believes that the use of pasture areas to the detriment of legal expansion into areas of native vegetation can reach 80% in MATOPIBA in 2030.

13. TNC (2019).

Another strong economic incentive for the rural producer is the conversion of open areas into native vegetation. In this case, financial compensation programs and other efforts become feasible alternatives to adjust the financial return. “These mechanisms can be one of the tools of sustainability policies to

achieve commitments to purchase deforestation-free commodities along the value chain”, the same TNC study emphasizes. Flávia thinks more broadly: “A complete package of well-orchestrated actions is needed to achieve sustainable development more quickly, in which all actions are licensed according to the region’s capacity, adequately financed and supervised”, she concludes.

Sustainable agricultural technologies, such as those provided for in the ABC Plan, in addition to mitigating carbon emissions, have the potential to increase productivity and reduce pressure to expand new agricultural areas. Booklet 2 of this series presents in detail these productive practices of the ABC Plan. Booklet 6 addresses the alternatives to intensify livestock production in MATOPIBA.

Did you know?

The transition from a landscape of native vegetation to agriculture rarely takes place immediately. The land commonly is cleared and left unused during soil preparation, or simply abandoned for a few years, before finally being used for agriculture. This process makes it difficult to determine the direct causes of the conversion. TNC’s remote sensing studies of land use in the Cerrado¹⁴ show that it generally takes up to five years for agricultural production to be detected in areas of native vegetation converted to soy production¹⁵.

Source: TNC (2019).

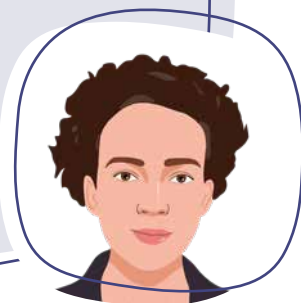
14. Mário Ramos-Neto and Leandro Claudio Baumgarten are currently developing the study Soybean Conversion and Crop Pattern in the Brazilian Cerrado (1985-2017).

15. It is unlikely that other economic activities with lower returns could temporarily occupy the area, as the five-year period considered by TNC is too short to generate cash flows that would justify the conversion without the subsequent consolidation of soy production.

How is the quest to guaranteeing sustainable soy?

"Proforest supports companies in carrying out responsible purchasing. In order to ensure that you are buying soy produced in a socially and environmentally responsible way, the first thing is to be clear about what your commitment is. For many companies, this can mean different things. For a trader, for example, buying directly from the producer means knowing if the area of origin is compliant or not. There are public lists in Brazil that enlist producers that are under investigation for slave work and properties that have environmental embargoes related to illegal activities. These public lists are the basis for traders to make sure they buy soy that is socially responsible and environmentally sustainable. It is a very important mechanism widely used in Brazil. However, it is not enough, because our government's ability to ensure that all legal activities are identified and scrutinized is limited. There are other companies that take more proactive approaches and implement due diligence. They evaluate their suppliers and try to understand what the gaps in their practices are, obtaining more information about how that soy is produced."

Jane Lino



What is sustainable development?

Sustainable development is a long-term condition for the well-being of humanity based on three pillars – economic, environmental and social. At the United Nations Conference on Environment and Development (Rio-92), held in Rio de Janeiro in 1992, changed the way of thinking about this development. It was necessary to reconcile it with the use of natural resources so

that current and future generations could have a productive life in harmony with nature^{16,12}

From this definition, agriculture that uses natural resources faster than the environment can regenerate them¹⁷ and/or that depends heavily on non-renewable resources – for example, fossil fuels – is considered unsustainable. Therefore, one of the goals of sustainable agriculture is to create agricultural systems that mitigate or eliminate the environmental damage associated with these practices. In this sense, sustainable agriculture is more than establishing changes in production techniques adopted until then. Sustainable agriculture is part of a movement that recognizes that natural resources are finite, and that economic growth is limited. The social and economic aspects of equity in the distribution of resources are also important for achieving sustainable development.¹³

In fact, there are several initiatives in rural areas that seek to promote sustainable development. Aline Leão defends that “good agricultural practices should be mandatory and not only recommended, because they are essential”. Flávia Pinto counters by highlighting the dimension and complexity of the sustainability topic. “From the landscape point of view, for you to be sustainable, you have to go beyond the rules established by the Forest Code, you need to start a dialogue with local actors that goes beyond the legal rules applied to the property.” In addition to dialogue, Caroline Rolim speaks of the importance of the initiative. “For me, sustainability is something you have to go after, to be always in constant evolution. You have to be studying, getting informed, looking for solutions and trying alternatives”, the expert points out. Caroline and Flávia defend the idea that the key to this development lies in valuing science. “Unfortunately, our law is not enough to maintain all ecosystem services, biodiversity and environmental quality, there needs to be a global pact.” For Flávia, “there is no point in promoting isolated actions. Changing the landscape of a region to a more sustainable model is only possible, if there is a pact between different institutions at all levels of governance”.

16. Soubbotina (2004).

17. Horrigan, Lawrence and Wlaker (2002).

MATOPIBA: a part of a biome

As the *Proforest* expert reminds us, talking about MATOPIBA is very interesting. MATOPIBA is a section of a biome, and it is not, officially, a region or political division of the national territory. She explains that, for many companies she has worked with, it was not easy to make them understand that MATOPIBA was not a Brazilian state, but a very comprehensive region, which spans several states, and which is located in the north region of the Cerrado. If, on one hand, the size of MATOPIBA and its productive potential draws attention, on the other, it shows us that heterogeneity is striking, especially in aspects involving governance, implementation of the Forest Code, rural credit, initiatives, etc.

From the point of view of preservation, understanding this territory is fundamental. The Cerrado region in MATOPIBA is characterized by savanna vegetation, with natural grasses; that is, it is not forest vegetation for the most part. Lino explains that, although it may seem quite obvious to many, understanding these aspects was a relatively recent process for companies.

"Companies were still arguing a lot about deforestation, not native vegetation degradation, which includes other types of vegetation. The MATOPIBA region, in a context of deforestation only, would not be a priority if compared to Mato Grosso, for example, which has a Cerrado with more forest-like vegetation."

Jane Lino



The expansion of soy in MATOPIBA is recent. The grain is the main economic activity within the region and, in many areas, this generates enormous pressure to expand into new places. "The lack of land title regularization that

plagues the whole of Brazil ends up contributing to the generation of a very common problem, which is land grabbing”, Lino points out.

The TNC study shows that “older” production areas, such as in Mato Grosso and the south of the Cerrado, have significantly less excess legal reserve in the properties. This explains why a significant part of the current soy expansion in these regions takes place over pastures, while in MATOPIBA the acquisition of new land and degradation of native vegetation is the predominant model. The study also shows that the highest financial return for producers is still in the expansion into the surplus of native vegetation within the property (from 1% to 21.1% of internal rate of return in MATOPIBA and 21% in the south of the Cerrado).

“The main reason behind these numbers is that producers do not incur land acquisition costs to expand within their properties. In these situations, the cost of not converting excess native vegetation into cultivated area is too high for the producer. The alternatives to promote expansion in the ZDC model should be more robust.”

Source: TNC (2019).

For Flávia Pinto, from TNC, it is necessary to discuss a global vision that can provide subsidies to build the sustainability map for MATOPIBA. In it, for each class of region that ends up being built, recommendations for sustainable production can be provided. “You can’t change the landscape of a region so that it becomes more sustainable if there isn’t a pact between different institutions at all levels, from the producer to the buyer and the Government”, she defends. She also highlights the need for a sustainable development policy, in addition



to regularization and funding for sustainability actions that respect each region's natural aptitudes.].

Responsible soy production is associated with the tripod of sustainability – social, economic and environmental. In terms of the environment, Aline Leão gives the water aspect as an example, which affects the entire Cerrado. The expert ponders deeply on the fragility of this ecosystem service. “There is great sensitivity in relation to water resources in MATOPIBA. For me, a solution would be to implement a type of zoning or conservation practices in the areas that are most impacted, mainly in the Urucuia aquifer recharge areas”, she concludes.



"As long as we don't have this [sustainable development policy], we are going to move slowly. We need to give farmers a financial incentive to implement the best practices so that they become a little more environmentally friendly. With the good results from these actions, they can adopt sustainable practices that go beyond their property."

Flávia Pinto

IT'S IMPORTANT TO VALUE WOMEN'S SPACE, ESPECIALLY AROUND PROPERTY MANAGEMENT

The context of soy production in Brazil is also intrinsically linked to the issue of gender. As has been shown throughout this series of booklets, talking about women from the countryside is, as a rule, talking about challenges. They are in the process of experimenting with rural productive dynamics, leading small properties very focused on subsistence crops. There is a strong family atmosphere on these properties, as it is shown in more detail in Booklet 8, which deals with traditional communities and family farming. It is also what Jane Lino highlights: “There is an interesting issue to observe in the poorest regions of Brazil. This is where we have more female leaders, but the main activity in their properties is subsistence agriculture, not soy”.

According to data from the 2017 agricultural census, only 6% of the management of large rural soybean properties in MATOPIBA is carried out by women. “It is very common, in terms of business, for the large [producers] to be family groups, led by men,” she says. Booklet 3, which deals with rural credit, shows the role of succession on rural properties as a decisive factor for the presence of women in the production process. “There are some economic groups, some companies that own large properties. But in various regions, and in MATOPIBA it is no different, they have family groups. So, this goes from father to son”, Lino analyses.

She also mentions an interesting initiative for the empowerment of women, promoted by the Round Table on Responsible Soy in Maranhão. This initiative, as well as the socioeconomic profile of the region, are presented in the introductory booklet of this series. “Movements like this, despite being incipient and sparse, are very important for the change of culture”, the expert concludes.



Jane Lino

“ There is certainly a cultural issue in our country, but we need to create spaces for valuing women in these leadership roles. Women do not need a special space just to fill in the ‘women quota’. They need a space because they are leaders, it is for this reason that they must be given a space to speak, a space of respect. ”



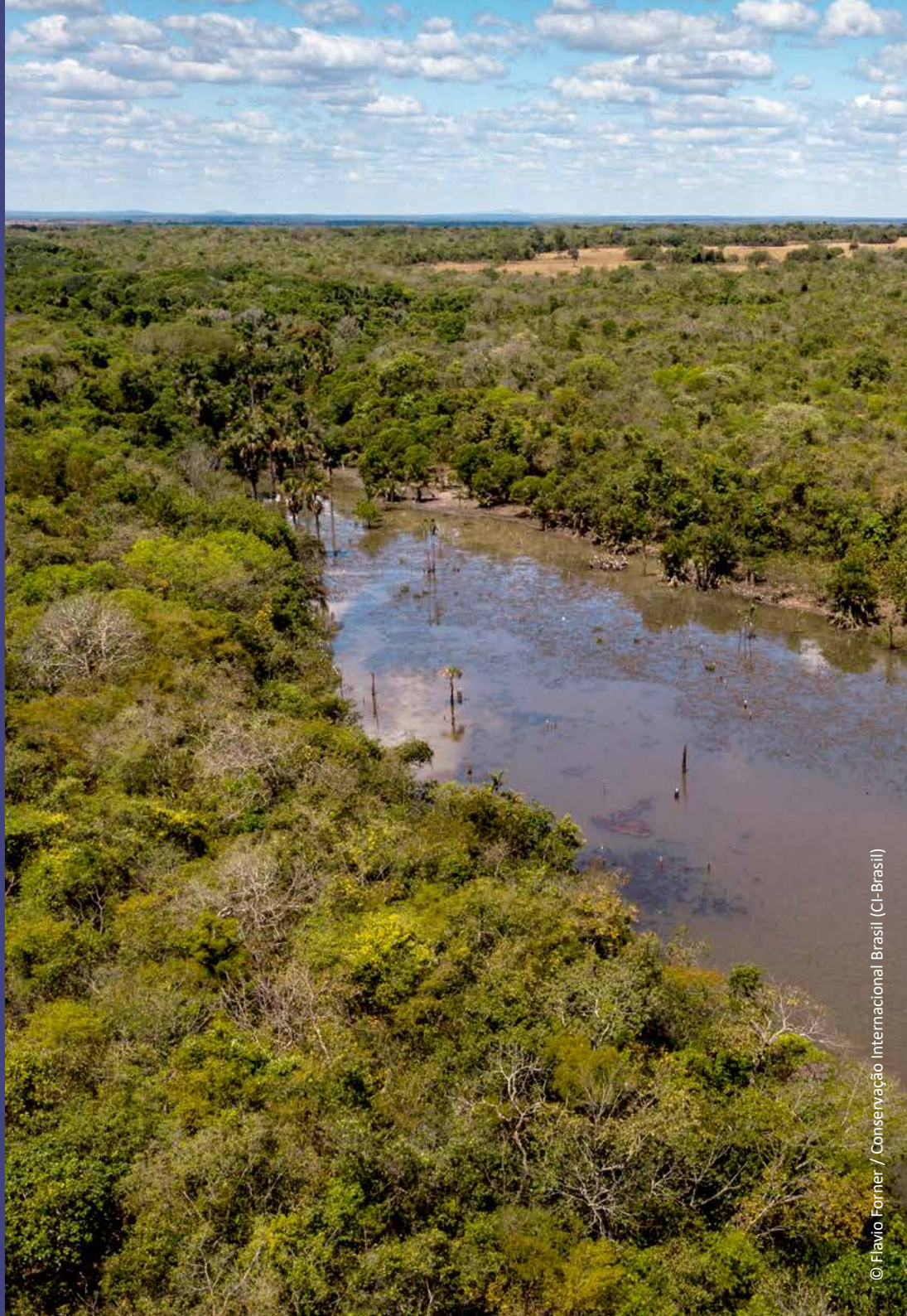
Flávia Pinto

“ Although women are the majority in sustainability teams and discussions, often coordinating them, men still present and impose more of their opinions in discussion forums on the topic. Unfortunately, in some cases, they force their point of view, disregarding or even repeating the women's inputs. ”



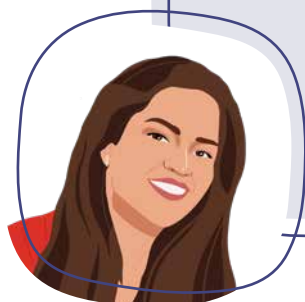
Aline Leão

“ On my field trips and visits to farms, I saw that women support their husbands. Sometimes they are more than the right hand, they are business partners. They become the managers of the farm, generally taking care of the administrative part. However, there is not always a de facto recognition of this role. The ‘agri-world’ is still very much directed to the ‘agri-man’. ”



CHALLENGES FOR THE FUTURE

The TNC study, widely used in this booklet, argues that a response is needed. A response that combines the redirection of part of the land to soy, while encouraging the sustainable intensification of livestock on the remaining pastures. This accommodates any expected future increase in the demand for food in the Cerrado, without additional conversion of native vegetation.



"We are trying to gain space everywhere. Agribusiness is, perhaps, the most difficult, because it is an extremely sexist environment. But we, as women in urban areas, are still trying to achieve pay equity today. We are looking for recognition in administrative, technical and other jobs. So, what will you say in the field, right?"

Caroline Rolim

There are many players involved in the dynamics of land use change, and this greatly impacts the commodity produced, in addition to generating pressure for an increasingly sustainable agriculture for those who are producing. Empowering organizations, regardless of whether they are public or linked to civil society, is part of solving the problem in reaching an optimal point in the demand versus supply equation. Women can play a strategic role in all of this.

"Women have an almost intrinsic interest, something even instinctive, in the evolution of the species. This can be observed both in the management and in the protection of their families, in the women being concerned with sustainability as a survival strategy. So, I think it turns out that women are more empowering, and are more concerned about keeping the environmental agenda as important."



Caroline Rolim

As the experts have shown, sustainability is a cross-cutting issue, and very connected to the female universe, even when analyzing all stages of the soy production chain in Brazil. There were many achievements, but "we are still light years away from having equity in the field. There is still a lack of support and recognition from our colleagues", Rolim concludes.



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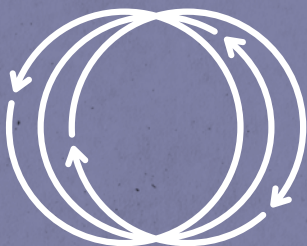
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GOOD GROWTH PARTNERSHIP





SUSTAINABLE INTENSIFICATION: THE LIVESTOCK PRODUCTION CHAIN

Recovery of degraded pastures and integrated
production systems as alternatives for intensification



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Brasil



GENDER PERSPECTIVES FOR SUSTAINABLE
PRODUCTION IN MATOPIBA

SUSTAINABLE INTENSIFICATION: THE LIVESTOCK PRODUCTION CHAIN

Recovery of degraded pastures and integrated
production systems as alternatives for intensification

Brasília/DF, 2021

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TRANSLATION

Matheus Sanitá Lima

1st edition

This series of booklets “**Gender perspectives for sustainable production in MATOPIBA**” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the Brazilian rural environment even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF ¹ -, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This booklet brings the theme **Sustainable Intensification: the livestock production chain – recovery of degraded pastures and integrated production systems as alternatives for intensification**. Beef is one of the main products of the Brazilian agricultural sector and beef cattle farming is one of the most common activities in the agricultural frontier areas. What are the dynamics of cattle farming in MATOPIBA? Is it possible to expand sustainable livestock production without illegal deforestation through the use of low productivity and degraded pastures? How to value women's space on rural properties in the region? These are some of the guiding questions for this publication. The experts **Mariane Crespolini** and **Luzêni Neres** share their perspectives and perceptions throughout this work.

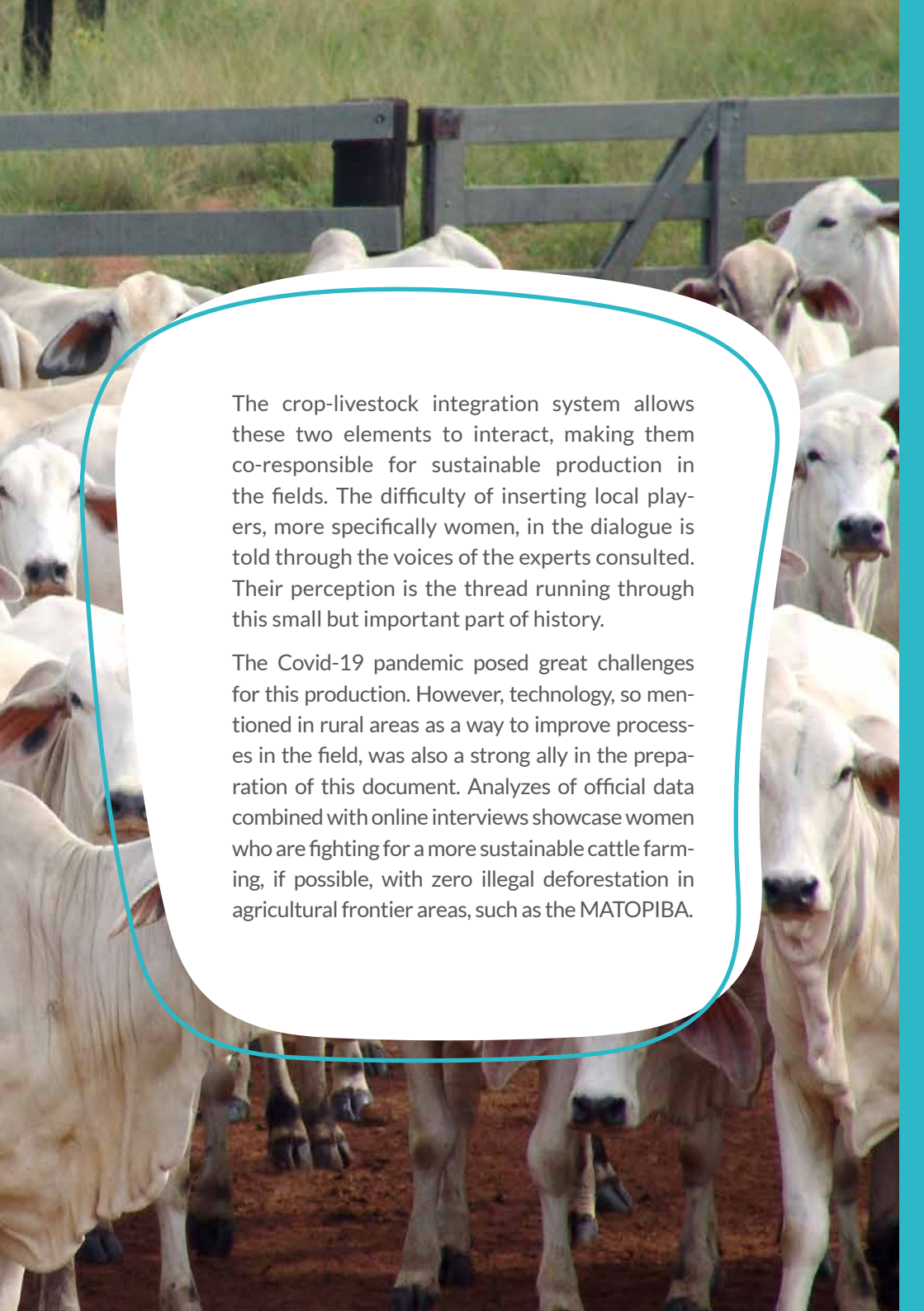
Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.

A photograph of a herd of white cattle, likely Nellore, in a field. A wooden fence is visible in the background. The image is used as a background for the document.

INTRODUCTION

This booklet analyses, from a gender perspective, the dynamics of the sustainable intensification of the livestock production chain. Talking about this topic is a great challenge for Brazilian agriculture. Based on the inputs of two experts, the main themes associated with the sustainable production of beef and its expansion along agricultural frontiers are presented. Incentive strategies for cattle farming in degraded pastures in MATOPIBA – Maranhão, Tocantins, Piauí and Bahia – are also discussed. Increasing sustainability in the livestock production chain has become a commitment not only to the livestock world, but also to other commodity chains, especially of soy.

A photograph of a herd of white Zebu cows in a field. The cows are standing on reddish-brown soil, and a wooden fence is visible in the background. The image is used as a background for the text overlay.

The crop-livestock integration system allows these two elements to interact, making them co-responsible for sustainable production in the fields. The difficulty of inserting local players, more specifically women, in the dialogue is told through the voices of the experts consulted. Their perception is the thread running through this small but important part of history.

The Covid-19 pandemic posed great challenges for this production. However, technology, so mentioned in rural areas as a way to improve processes in the field, was also a strong ally in the preparation of this document. Analyses of official data combined with online interviews showcase women who are fighting for a more sustainable cattle farming, if possible, with zero illegal deforestation in agricultural frontier areas, such as the MATOPIBA.

LUZÊNI NERES



Graduated in Journalism from the University of Gurupi (UnirG) and a cattle breeder, Luzêni is the granddaughter and daughter of rural producers. In addition to journalism, she took a technical course in Agribusiness at the National Service for Rural Learning (SENAR) and another one at the Federal Institute of Tocantins (IFTO). More recently, she also completed postgraduate studies in Agribusiness, Business Management and Competitive Intelligence. It was from her academic journey and participation in the training program for agribusiness leaders, the CNA Jovem, that she began to understand the opportunities that succession in the field can generate for rural businesses. Her education also allowed her to visualize the possibility of exploring sustainable agribusiness through communication.

The daughter of small rural producers from the countryside of São Paulo state, Mariane has a degree in Environmental Management from the University of São Paulo (USP), with a master's and doctorate in Economic Development from the State University of Campinas (Unicamp). Her interest in animal husbandry emerged when she did her bachelor's degree. She worked in her field of specialization in Europe and Mato Grosso state (Brazil) until taking over as head of the Sustainable Production and Irrigation Department at the Department of Innovation, Rural Development and Irrigation of the Ministry of Agriculture, Livestock and Supply (SDI / Mapa).

MARIANE CRESPOLINI



THE RURAL PRODUCER IS LIKE ANY TYPE OF ENTREPRENEUR

Pasture areas are strongly associated with the most significant changes in land cover use in the country. Such changes can also entail conversion of native areas to agriculture and crop-livestock-forest integration (ILPF) systems. Pastures occupy approximately 21% of the Brazilian territory. These areas represent the opportunity to meet the demands that are important to the agricultural sector. They can also be part of the solution to some environmental problems by helping to eliminate illegal deforestation (Booklet 5 discusses the responsible expansion of soy); by helping increasing livestock production to meet consumer demand; by promoting the country's economic development; and by freeing up areas for conversion to other uses – grain production and restoration of native vegetation, for instance. In contrast, pastures also carry the potential to be the root cause or aggravation of environmental impacts².

Approximately 45% of the natural vegetation of the Cerrado has already been converted for different types of anthropic uses, that is, it has been transformed by human action: 29.5% linked to cultivated pastures, 12% to annual and perennial agricultural crops and 1.5 % to forestry³. In the last ten years, the agricultural expansion into the Cerrado was essentially carried out in areas already anthropized (74%). Across the biome, at least 33.4 million hectares of anthropogenic areas would have the potential for conversion to grain production⁴.

2. Ferreira Júnior (2020).

3. Sano *et al.* (2020).

4. Carneiro Filho and Costa (2016).



Did you know?

According to the Greenhouse Gas Emission and Removal Estimation System (SEEG)⁵, in 2019, land use change was the main responsible for the total CO₂ emission (44%) in Brazil, followed by agricultural production (28%). In this sector, in turn, cattle farming accounted for 69% of CO₂ emissions. In this extremely worrying scenario, there are promising signs of changes coming from society (consumers), producers and research institutes. On one hand, there are consumers willing to pay more for meat with a sustainability certificate; on the other, there are rural producers willing to adopt the technology developed by the Brazilian Agricultural Research Corporation (Embrapa⁶) for the production of “carbon neutral meat” (CCN), based on the adoption of ILPF systems⁷.

5. Available at: https://plataforma.seeg.eco.br/total_emission.

6. Translator's note: EMBRAPA stands for “Empresa Brasileira de Pesquisa Agropecuária”. A suitable translation would be “Brazilian Agricultural Research Corporation”.

7. Zanasi *et al.* (2020).



One of the ways to achieve this goal is through the adoption of agricultural practices of pasture intensification, made by the application of fertilizers and herbicides, along with replanting with better varieties of grass, genetic improvement of cattle herds and more efficient regulation on herd densities and rotation schedules.

"The change from the extensive to the intensive system, from a system of degraded pastures to a system that takes care of the soil... is a path that we are building. When I take this information, like the one that cattle that drink water from irregular sources, stop gaining 300 g per day, I feel part of it. People say: 'Wow, I'll put this into practice'.



Whether you like it or not, we talk a lot: rural producers are like any entrepreneur, they want to see an economic result too. Then their eyes start to shine for the financial results, the quality, the increase in productivity – when they start to see all the legacy they are leaving, their vision completely changes."

Luzêni Neres

What does the research show?

A survey published in the journal *Scientific Reports*, a periodical publication by the Nature group, reveals that the use of nitrogen to fertilize pastures could multiply up to three times the productivity of Brazilian beef cattle, eliminating the need for new pasture areas and exponentially reducing the pressure of deforestation in the Cerrado and the Amazon. The study was applied over three years, in a continuous grazing system with variable occupation rate, evaluating the effects of nitrogen fertilization on forage quality of marandu grass (*Brachiaria brizantha*) and animal production⁸.

A LITTLE BIT OF CONTEXT

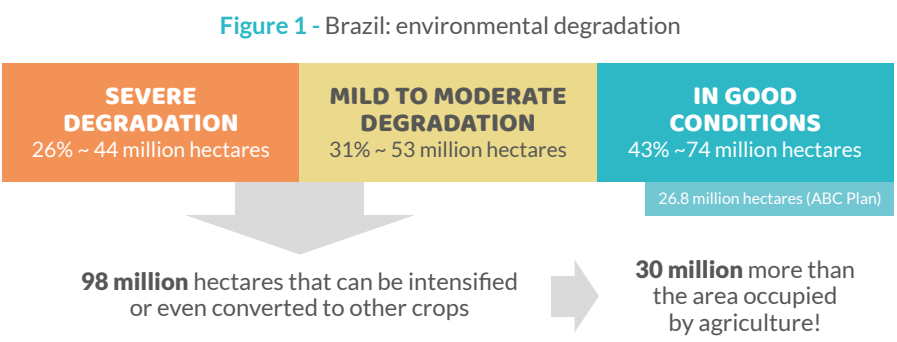
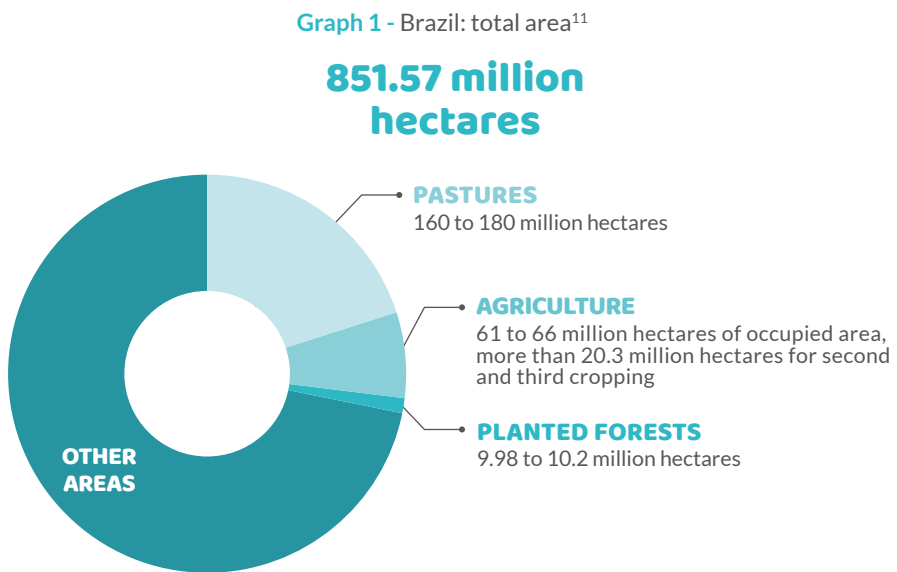
"Livestock is part of the solution, not the problem."

Mariane Crespolini

Livestock has historically played an important role in expanding the agricultural frontier, especially from the 1970s onwards. Pasture has contributed to the occupation of the soil and the replacement of native vegetation cover, that is, it played a relevant role in the conversion of native vegetation in the Amazon and in the Cerrado. The areas were initially opened for the formation of pastures. In these areas, brachiaria grass was sown. Normally, brachiaria has high yields for four to five years. After this period, soil nutrients are depleted and

8. Delevatti *et al.* (2019).

forage production declines, forcing ranchers to abandon areas and open new pastures. The areas that are in some stage of degradation in Brazil total almost 118.9 million hectares in 2019⁹. If recovered, they could produce and prevent more illegal deforestation¹⁰.



Source: Brazilian Institute of Geography and Statistics (IBGE), Federal University of Goiás (UFG) and Embrapa.

9. Available at: <https://pastagem.org/map>.

10. Fearnside (2002).

11. Pastures, crops (permanent and temporary) and planted forests occupy between 27% and 30% of the Brazilian territory, depending on the database.

For many countries, cattle farming in Brazil is linked to environmental problems with several environmental liabilities. Consumers from high-income countries have the potential to diminish imports from Brazil. One of the production strategies that can add value is meat with low CO₂ emissions (Booklet 2 discusses low-carbon agriculture and illustrates how sustainable livestock can help mitigate the greenhouse effect).

According to the CCN brand, the shade formed by the tree-tops helps providing a thermally comfortable environment for the cattle, which contributes to a high degree of animal well-being. This is closely linked to the benchmark of innovation of ILPF and it only strengthens the brand. The official launch of CCN, in 2015, was an important milestone for Brazilian agriculture, with repercussions in national and international political spheres.

CCN is a customizable and auditable concept brand, which aims to certify beef produced in livestock-forest or agroforestry (crop-livestock-forest) integration systems, through the use of specific protocols that enable the certification process. The main goal is to ensure that the animals had their enteric methane emissions compensated by the growth of trees in the integrated system¹².

The State of Mato Grosso do Sul has started the process to become the first carbon neutral state in Brazil and it is planning to implement public policies to promote the CCN brand. The application of CNN will be validated in other biomes, in addition to the Cerrado. That is possible only because there are already technologies available for the implementation and management of ILPF considering the peculiarities of each region. The strategy of conducting ten Technological Reference Units (URT) in different regions of Brazil, integrated to the ILPF¹³ Network, for the dissemination of regionalized data and protocols is noteworthy. Given the great repercussion in the sector, the CCN brand can be an important facilitator for the Sectoral Plan for Adaptation to

12. Alves, Almeida and Laura (2015).

13. More details about this network are available at: <https://www.redeilpf.org.br/index.php/rede-ilpf/o-que-e-a-rede-ilpf>.



Climate Change and Low Carbon Emission Agriculture (Plan ABC+). Two important points should be highlighted: this technology is innovative and 100% Brazilian, with no similar initiatives in the market at the time it was proposed; and it's a technological solution developed by Embrapa in partnership with other institutions¹⁴.

Integrated systems that incorporate agriculture, livestock and forestry, in a spatial and/or temporal dimension, seeks synergistic effects among their components. The synergy of this agroecosystem is aimed at the sustainability of the production unit, considering its environmental adequacy and appreciation of natural capital¹⁵.

14. Alves, Almeida and Laura (2015).

15. Balbino *et al.* (2011).

Integrated systems can contribute to the sustainable intensification of land use, taking into account the land-saving effect, the positive technical and economic impacts and the improvement on biological activity and soil quality. In fact, the effects of synergism and complementarity are taken advantage of when two or more agricultural production activities are combined in the same area. In addition, they help mitigate some greenhouse gases (GHG) effects and reduce the pressure for deforestation.

Integrated production systems can be adopted by both large and small rural producers. In Brazil, there are several policies to encourage the adoption of integration systems involving public sectors, at national and state levels, as well as actions by the private sector. This booklet presents examples of public policies, private actions and public-private partnerships to encourage the adoption of integrated crop-livestock-forest systems in Brazil¹⁶.

THE CHALLENGE IS TO GET THE CORRECT INFORMATION TO THE PRODUCER

"Agriculture is an open-air industry."

Mariane Crespolini

If talking about sustainable cattle raising is still quite challenging for those outside the farm gate, for those who are inside, the biggest obstacle is getting correct and quality information. This is what Mariane Crespolini, director at the Ministry of Agriculture, Livestock and Supply (Mapa) defends.

16. Bungenstab et al. (2019).

“Mr. ‘Zé’, let’s do the math? Let me write the numbers and make a project for you.’ So, if I go to him and tell him to throw a truck of limestone and fertilizer in the pasture, he’ll say to me: ‘You’re crazy, I’m going to spend the value of two arrobas per hectare’. Now, if I sit down with him and show that he’s going to invest and, with that, he’s going to be able to produce three times as much meat, then yes, he agrees. These were the calculations I made in my doctoral thesis – investing in sustainable intensification increases income¹⁷.”



There is already a lot of talk that technical assistance and rural extension are essential for the countryside, and this is even more evident when the topic is real sustainable intensification, which can objectively change the livestock chain so that production and conservation is possible. The director at Mapa also highlights that the producer needs to be encouraged properly, whether through credit, assistance or participation in field days, which is a key moment for exchanging experiences and knowledge among producers. She recalls a project from the Ministry of Agriculture, carried out with resources from the Forest Investment Program (FIP) in partnership with the World Bank, Embrapa and the National Service for Rural Learning (Senar) – the ABC Cerrado –, which recovered 93 thousand hectares of land with a sustainable agriculture system between 2015 and 2019. “For every Real (R\$) that the project invested, the rural producer put R\$7 out of his pocket, either with investment, buying input, or through the available labor. Nothing better than seeing in practice that owning a sustainable property, regardless of the aspect, is possible and profitable over the years”, she highlights.

The producer Luzêni Neres shows that this inter-neighborhood relationship is a great first step. In addition, she highlights the role of training and qualification for the application of sustainable technologies.

17. Dos Santos (2020).

“The other day, when I arrived with fertilizer, my mother said: ‘That much fertilizer for this little piece of land?’ Our soil needs that much fertilizer, and I’ve been advocating this a lot; to apply the better technology, so that we can prove that sustainable technology is possible, that producing sustainably is possible. My uncle, for example, has a vision of the future, he is sensitive to these issues, but if I tell him I have to put 13 tons of limestone, he puts 7. Here in my property, we have an area of 3 acres that had never seen lime in the pasture, fertilizer in the crops and the vegetable garden and specific fertilizer in cassava, the way we are doing now. What I notice is that many producers think that the door at Embrapa is very difficult to open [for training, qualification, etc.]. I’m proof that it is not!”



Luzêni Neres



© Flavio Forner / Conservação Internacional Brasil (CI-Brasil)

Technical assistance and family succession

"Some people say 'wow' and there are others who say 'I don't know, you're burying money.'"

"From 2016 until now, when I joined CNA Jovem, I started to see the succession and thinking that we have a property of 6 acres in the region of Dois Irmãos, in Tocantins. The property today has only extensive cattle raising and my mother says we cannot experiment with even a tree. So, I show her the result here on the Miranorte property, with 3 acres – I've always heard from people that the space 'is too small for beef cattle! I would reply: 'But I know it is possible! At the beginning of 2020, we made a production with Embrapa and in this work I got to know ABC Corte more closely, in which I began to realize that the universe of technical assistance is not exactly rocket science. It is a program that allows me to produce on pasture with picket systems and intensive stocking rate. But for that, I will need to practice a whole methodology, with strategic planning and an action plan. Putting it into practice was also not a high investment as I thought. When my husband and I started the production at ABC Corte in February 2020, the pandemic came and in March we moved to our property. Until then, I was a theorist, even though I had some experience acquired from and with my parents. And then, on January 1st, 2021, the tractor entered our experimental area of just over 2 hectares for the first time. The City Hall, through the Department of Agriculture, provided us with technicians of environmental management and environmental engineering for a visit. Our concern was with the protection of the spring we have in here. We follow all guidelines of the ABC Plan. We now have a pilot project for sustainable livestock farming – we are less than 1km from the city. Our perspective is to reach the completeness of the program as planned, because we are interested in placing beef cattle in the intensive system for finishing fattening and, thus, also opening up other possibilities, such as buying and selling animals", says Luzêni Neres.

IS LIVESTOCK REALLY PART OF THE SOLUTION?

One of the problems of livestock is GHG emissions. Currently, Brazilian agriculture is responsible for 33.6% of GHG emissions in Brazil and, of these, 60% come from the enteric fermentation¹⁸ of animals. If we apply an extensive production system, it is a problem, but if the sustainable intensification of this production is carried out, one can speak of neutralization within the same rural property, within the production system. With this neutralization it is even possible to guarantee food safety. Obviously, a drastic solution would be to completely stop eating meat and meat products, but is this possible on a global scale? What Mariane Crespolini, from Mapa, defends is that the establishment of a sustainable production system is the solution, including livestock as part of it. “I have examples of rural properties that produce ten times more meat in the same area than the national average. So, what do I need as a solution? To encourage these livestock production models to advance in the processes of adding value to this meat, raising awareness and providing information for the end consumer to seek product traceability, dialoguing with the carbon footprint”, Crespolini states.

The expert recalls that livestock, in the extensive model, is unsustainable, although it provides a very low economic risk; also because of this factor, it is so widely applied in Brazilian rural properties. It is very difficult for a cattle farmer to go bankrupt – the opposite is true for an agricultural producer, who needs to adjust their technologies to the time of planting, harvesting, etc. The cattle farmer might earn little, but they have assets (the property), that allow them to continue in this activity. Even in the case of leases, for an agricultural crop such as soybean, the cattle farmer can lease part of the property, but hardly disposes of that territory. Crespolini believes that this movement is positive in terms of sustainability in Brazil, especially because the low risk of the activ-

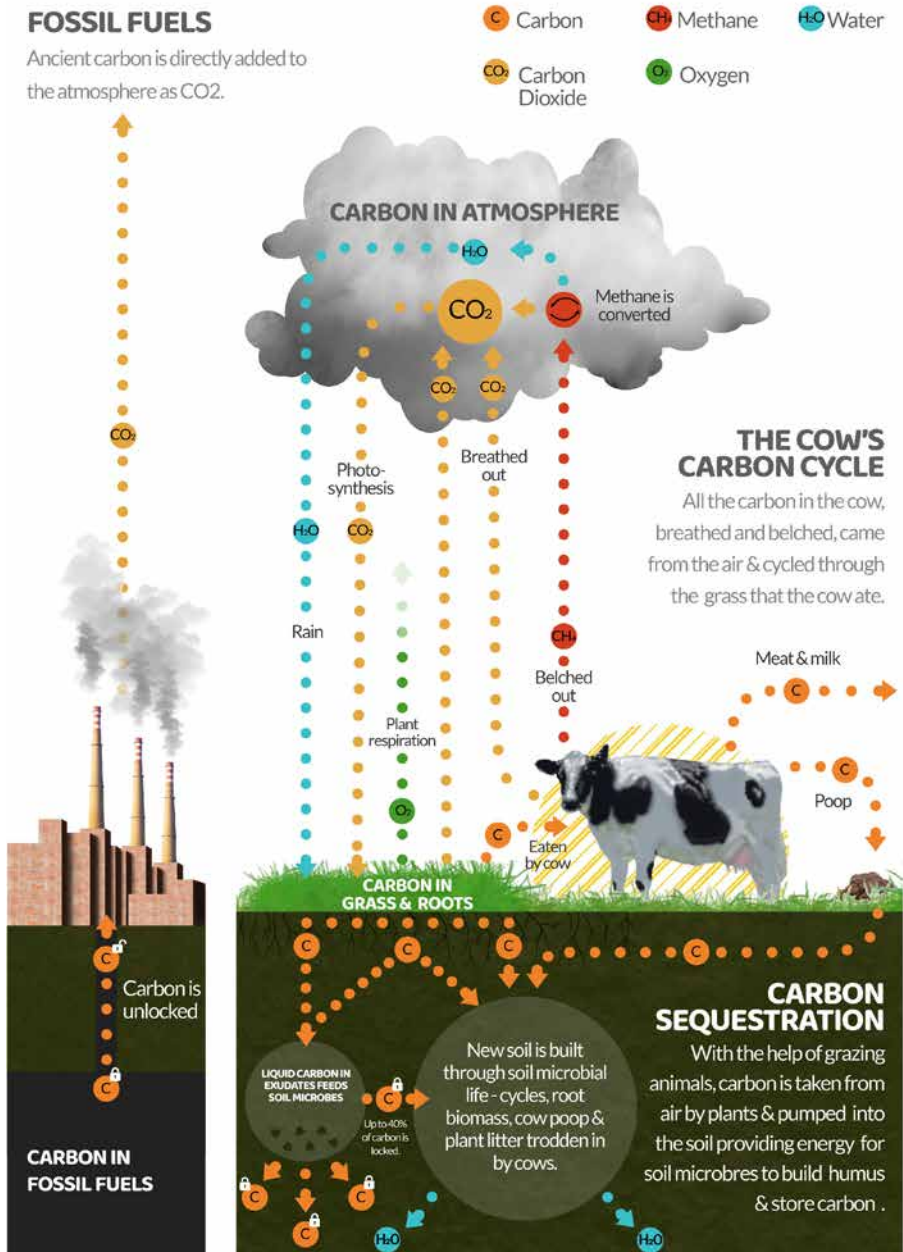
18. Ruminant herbivores such as cattle, sheep, buffaloes and goats, through enteric fermentation, a digestive process that takes place in the rumen, produce methane. Global emissions of this gas generated from enteric processes are estimated at 80 million tons per year, corresponding to about 22% of total methane emissions generated by anthropogenic sources. Available at: <www.cnpma.embrapa.br/projetos>

ity. “The key is awareness of the opportunity cost. The cattle raiser who earns R\$ 100 per hectare per year, for example, is very difficult to go bankrupt. But imagine if they could earn five times as much? This is what we see in properties with sustainable production systems, with the implementation of ILPF, as is the case with Marize (owner of Fazenda Santa Brígida, in Goiás), which earns up to R\$2,500.00 per hectare”, the specialist explains. Although the adoption of more sustainable systems is intrinsically linked to increased financial risks, technologies that encompass climate, market and price fluctuation risks, for example, can circumvent them. “I really believe that education is the solution for this. I also believe that technology and education go together to add value”, Crespolini defends.

Directly in the field, producer Luzêni Neres points out, once again, the need for technical assistance that enables sustainable production. “To think that a state with 139 municipalities [Tocantins], which has livestock as the second largest economic activity, but which has only 61 URTs... it is still very few. Producers are not implementing sustainable technologies because of the lack of information, because they do not know it is accessible, because they think their properties are too small”, Neres claims. Surveys show that around 47% of rural properties in Brazil are not yet connected to the internet. If, in normal times, the number is already frightening, the challenge becomes even greater when we are experiencing one of the biggest pandemics in human history, in which social isolation is common. Luzêni dreams of the time when it will be possible to produce a lot more meat, protect a lot more resources and see a lot more people understanding agribusiness, and cattle raising as a business. “It’s not to think, for example, that you’re leaving your life in the city to go to the countryside as a punishment”, says Neres, who was criticized when she decided to return to the family property after finishing college and after years of experience in the journalism market.

There are several peaceful points for the experts consulted: the Brazilian rural producer is the one who produces, who conserves soil and water. And they also fulfill this role because it is essential to maintain their own craft. “If they do not protect water, there is no water for livestock, which is so badly needed. An animal drinks at least 30 liters of water every time it reaches the drinking fountain”, Luzêni adds.

Figure 2 - Livestock carbon cycle versus fossil fuel carbon cycle



Source: Rodgers and Wolf (2020).

PIONEERING: WOMEN AS INNOVATIVE AGENTS FOR A SUSTAINABLE LIVESTOCK FARMING

Pasture degradation has become one of the main signs of low livestock sustainability in different regions of Brazil. Inadequate herd management is considered the main cause of this degradation. Among the main problems of Brazilian livestock are the degradation of pastures and soils; inadequate animal management; low nutrient replenishment in the soil; the physical impediments of soils; and low technological investments. These problems can be mitigated by intensifying pastures¹⁹.

For women, the challenge is always to be the best when talking about sustainable livestock and about improving income. Although there is a consensus that sustainable livestock technologies significantly improve earnings, they are commonly publicized by men. “If I am willing to be in charge of my parents’ property, I have to prove myself, be much more efficient, be a better manager than my brothers”, Crespolini affirms. The wife, even before the children, is the first successor of a property. Increasingly, women are known to have taken over the management of the property after their husbands’ death. The women interviewed for this booklet are unanimous in stating that, precisely because they do not have the historical cultural background of traditional management, they are open to the new ways of sustainably managing the soil and thinking about an integrated, green and sustainable livestock.

The ability to adapt to the changes that have been driving livestock production towards increasing sustainability – economic, environmental and social – is related to several factors, including gender. It makes all the difference who is in charge of this process, whether they are men or women. This sector, which historically has a predominance of male leaders²⁰, also has a strong tradition in rural Brazil, and is one of those that have strong needs to incorporate changes

19. Aidar and Kluthcouski (2003).

20. Available at: <https://bit.ly/3ld58AB>.

in the different stages of the production chain. In this context, the role of women is strategic when thinking about good practices for preserving the environment and managing natural resources within the property²¹.

On average, women have a higher level of education and have shown that they are great promoters of digital transformation in agribusiness and serve as inspiration for future generations²². The technical absorptive capacity has undoubtedly made them more resilient, as there is a direct link between technology and adaptive capacity. This adaptation is nothing more than the ability to multitask, from the simplest to the most complex, and that contributes to making them more practical and dynamic.

Brazilian agribusiness, more than ever, needs women and it needs to be open to all necessary transformations in the field.

Country Stories, Stories of Resilient Women



"I've heard many times, especially in the last couple of years, because I'm short, I'm just 1.58 m tall: 'How can a little person that size be in front of a property and with innovative ideas?' I've heard countless times from producers and technicians: Hey girl, what are you doing here? Do you really want to stick your foot in the mud? Why are you going to stick your foot in the mud? You can move elsewhere'. What I learned from my mother is that we don't have that 'ah, I won't do it' thing. We don't have this saying that 'we don't go to the edge of the corral'. We're going to the pigsty; we're going to grab a chicken... My uncle once even joked with my mother about how she raised us: 'You didn't raise your daughters to get married'. Then she laughed and said back, 'It's all my fault they're brazen like that,' and I say it's all her credit.

Luzêni Neres

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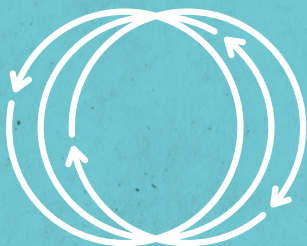
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GOOD GROWTH PARTNERSHIP





MANAGEMENT OF NATURAL CAPITAL ON RURAL PROPERTIES

The importance of the efficient use of natural
resources for the sustainability of production



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Brasil

GENDER PERSPECTIVES FOR SUSTAINABLE
PRODUCTION IN MATOPIBA

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Brasília/DF, 2021

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TRANSLATION

Matheus Sanitá Lima

1st edition

This series of booklets “**Gender perspectives for sustainable production in MATOPIBA**” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the Brazilian rural environment even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF ¹ -, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This booklet discusses the topic **Natural Capital Management in Rural Properties: the importance of the efficient use of natural resources for the sustainability of production**. What is the role of the gender element in this discussion? How does gender fit into the dynamics of management (and benefits) of natural capital in the Cerrado? What is the perception of women who work on this topic? These are some of the guiding questions this study seeks to answer. Throughout this publication, **Isabel Drigo** and **Lilian Vendrametto** share their perspectives and insights.

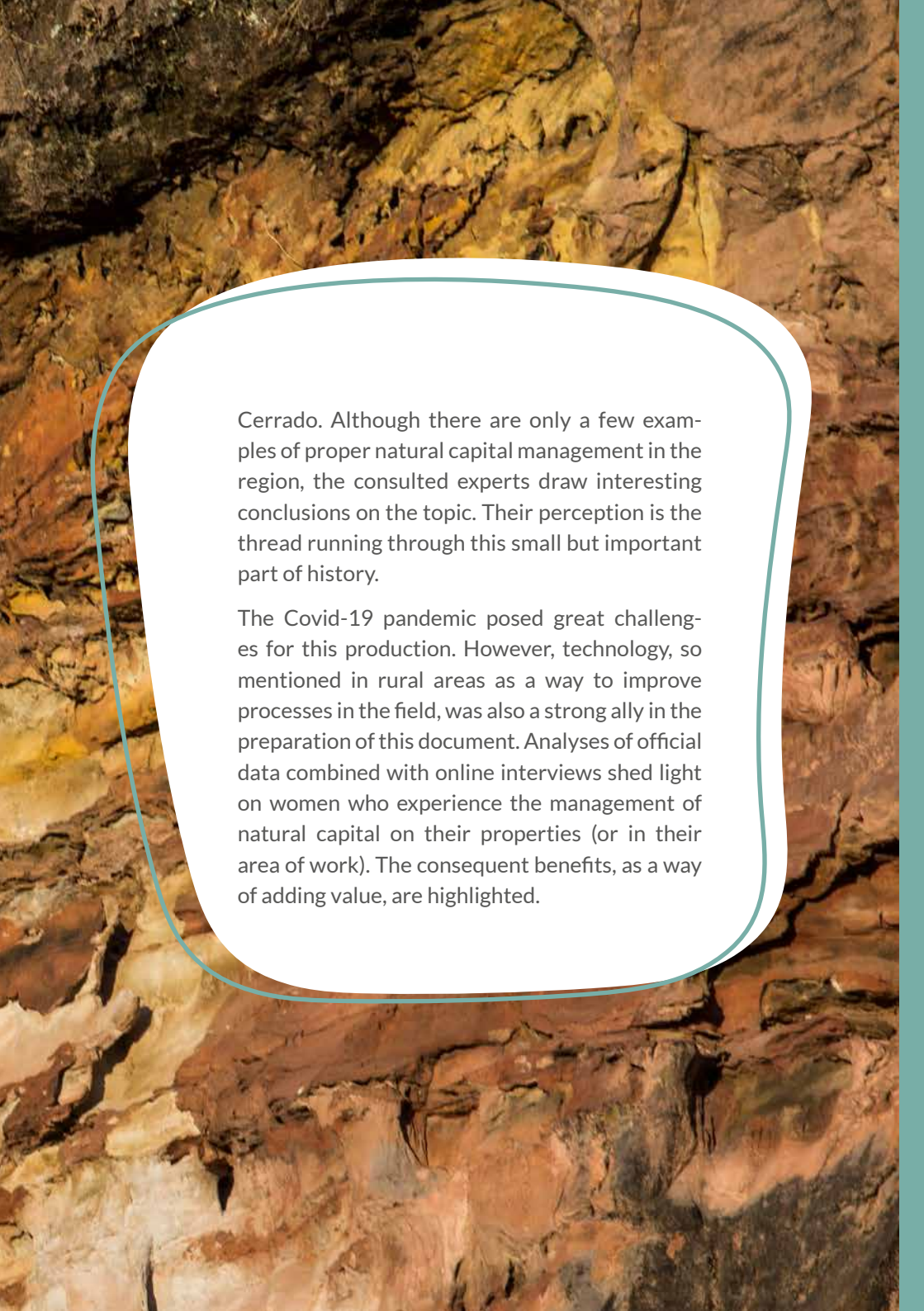
Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.



INTRODUCTION

This booklet analyses, from a gender perspective, the management of natural capital in rural properties in MATOPIBA – Maranhão, Tocantins, Piauí and Bahia. Through the experts' narratives, some clarifications about the various forms of natural capital management are presented. Important ecosystem services derive from the proper management of natural capital. In addition to adding value to rural properties, this capital is fundamental for the existence of agricultural activities. The consulted experts narrate their experiences with the topic and detail how certain actions can positively or negatively influence the management of natural capital in MATOPIBA. This is a new topic for the



Cerrado. Although there are only a few examples of proper natural capital management in the region, the consulted experts draw interesting conclusions on the topic. Their perception is the thread running through this small but important part of history.

The Covid-19 pandemic posed great challenges for this production. However, technology, so mentioned in rural areas as a way to improve processes in the field, was also a strong ally in the preparation of this document. Analyses of official data combined with online interviews shed light on women who experience the management of natural capital on their properties (or in their area of work). The consequent benefits, as a way of adding value, are highlighted.

ISABEL DRIGO

A journalist by training, with a master's and doctorate degree in Environmental Science from the University of São Paulo (USP) and a post-doctorate in Agricultural Economics from the Federal University of Rio Grande do Sul (UFRGS), Isabel gave up journalism to dedicate herself exclusively to research and produce science in this large area called sustainability, focusing on the boundary between sociology and economics. Isabel studies mainly the Amazon and the Cerrado, working with various production chains, such as beef cattle and soy. Never having left forests aside, she also studies topics involving forest management and tropical forests, both from the perspective of large companies and of traditional communities in the Amazon. Isabel is currently Manager of Climate and Agricultural Chains at the Forest and Agricultural Management and Certification Institute (Imaflora).



LILIAN VENDRAMETTO



An agronomist with a master's degree from the Superior School of Agriculture "Luiz de Queiroz", at the University of São Paulo (Esalq/USP), and a PhD in Production Engineering from the Universidade Paulista (Unip), Lilian has worked with several production chains, ranging from large agricultural companies to micro-producers. With extensive experience in the areas of agriculture and sustainability, with a focus on social and environmental management, health and safety, good agricultural practices, institutional and governmental relationships, multilateral dialogues and environmental education, Lilian currently is Director of Sustainable Landscapes at Conservation International Brazil (CI-Brazil).

WHY MANAGEMENT OF NATURAL CAPITAL?

The management of natural capital on rural properties encompasses the organization and monitoring of actions to control the environmental impacts of agricultural production. Internally, efforts are coordinated to improve the performance of resources such as water, soil and biodiversity. One of the tools that can be used in this management is the Inventory of Greenhouse Gas Emissions (GHG)². Another alternative is the adoption of Green Information Technology (Green IT) initiatives, which apply IT tools onto sustainable development. Natural capital management also involves the training of employees on social and environmental responsibility, the dissemination of eco-efficient practices, the adaptation of equipment to rationalize the use of goods and the adoption of protocols and certifications related to the environment.

Brazil is a big mosaic when thinking about agricultural areas. It is a complex equation, which involves a conjunction among protected natural areas, the management of natural capital on properties and agricultural practices. All of that while seeking a resilient agriculture that cares for the future and meets the demands for an expanding production. The implementation of programs for the efficient use of natural resources follows guidelines that consider environmental responsibility and eco-efficiency on rural properties. These programs happen through the management of various natural resources and the adoption of sustainable agricultural processes and practices. Such processes can and should involve the rational and responsible use of water, electricity, fuel, inputs and the proper disposal of solid waste.

The reduction of GHG emissions generated by agricultural production is also a constant concern. The adoption of agricultural practices that reduce carbon

2. According to the Brazilian Institute of Geography and Statistics (IBGE), the inventory of the National Bank for Economic and Social Development (BNDES) "is a voluntary environmental responsibility action started in 2012, with annual publication in the public emissions registry of the Brazilian GHG Protocol program. The initiative contributes to the commitment to promote the sustainable consumption of natural resources and materials derived from them, assumed by the BNDES upon adhering to the Protocol of Intentions for Social and Environmental Responsibility (Green Protocol)". Available at: <<https://bit.ly/399embz>>.



emissions contributes to the management of natural capital in rural properties, as presented in Booklet 3, which discusses rural credit.

In agricultural production, as well as in any goods and services, impacts on the environment are generated, which in the medium and long term may cause the loss of productivity. Unfortunately, available techniques do not always offer the possibility for adequate mitigation of damages or for fully replacing the natural resources that are used during the production of goods and services. Therefore, if there are negative effects, there is a need to review the production processes.

However, not all natural resources can be completely replaced. For this reason, they are classified as renewable and non-renewable. This leads to the conclusion that there are limits to the use of natural resources, and, consequently, to economic growth. From the mid-twentieth century, economic analysis began to consider the finitude of services provided by nature. That raised questions about the resilience of ecosystems to maintain the expansion of production and the economic system in course³. In other words, technical and technological progress can alleviate the pressure that all human activity exerts on the planet, but not eliminate it, as natural resources cannot be totally replaced⁴. This burden translates into environmental imbalances.

Based on this new perception, the concept of natural capital became a hybrid formed from economics and ecology. The idea of a natural capital emphasizes the importance of environmental quality as a pre-condition for the well-being of society and its (economic) sustainability in the long term⁵. A natural capital consists of “any element or system of the physical world (geophysical and ecological) that, directly or in combination with goods produced by the economy, provides materials, energy or services of value to society”⁶. Its importance is unquestionable, as it supports all human activity and provides, with goods and services, the world that keeps us alive.

Natural capital is the natural environment, that is, it is the stock of natural resources or existing environmental assets. For example, forests and arable land produce a flow of goods and services that are useful to society⁷. Along these lines, natural capital provides environmental functions that society can convert into useful goods and services to maintain or even enhance well-being in the short and long term. Therefore, economic, social and environmental interests arise, because the natural capital provides essential ecosystem goods and services for the survival of all species on the globe.

In the MATOPIBA region, the conclusion is that, if “there is no change in the way natural resources are perceived and valued by rural producers, as well as

3. IEA (2018).

4. IEA (2018).

5. O'Connor (1999).

6. O'Connor (1999, p. 20).

7. MacDonald (1999).

by the surrounding communities”⁸, there will certainly be economic growth only in the short term. In the long term, this growth will be compromised. The current scenario will lead to a decrease or stagnation of well-being because of the expansion of agricultural production. In addition, there will be a reduction in environmental sustainability, resulting in depletion of components such as soil and water. The main factors that would lead to this collapse in the long term are⁹:

- a. high degree of land and production concentration;
- b. growing aggravation of environmental problems (with the risk of depletion of natural resources and permanent scarcity);
- c. increased production costs;
- d. susceptibility to fluctuations in commodity prices in both the domestic and international markets;
- e. financing difficulties because of this instability.

Resource management in MATOPIBA

*“We want a long life
for agriculture, with
respect to good practices
and the maintenance
of soil microbiota.”*

Lilian Vendrametto

Brazil is beautiful and complex like an incredible work of art. Regions, biomes and landscapes are so unique, but complement each other and place the country as one of the most relevant and biodiverse on the planet. The continental size of Brazil is always highlighted. However, when it comes to land use, agriculture, native flora and fauna, there also is an amazing socio-biodiversity.

8. Seifer, Camargo and Drigo (2020, p. 7).

9. Seifer, Camargo and Drigo (2020).

MATOPIBA is a diverse agricultural frontier. The region is formed by large agricultural projects that intertwine with small and medium-sized farms. Pastures and crops, associated with native vegetation, form the local landscape. There are diverse reliefs and topographies. There is great potential for food production as well, but the conservation of the Cerrado is an issue that deserves and needs attention. “This region needs a balance between the production area and the conservation area - permanent preservation areas (APP) or legal reserves (RL), as we call it. This balance brings all the productive potential, from the genetics of the seeds, to the management of pests and to harvesting with modern equipment. Always in accordance with good agricultural practices. In order to explore all of this, we are totally dependent on natural resources”, Lilian Vendrametto, Director of Sustainable Landscapes at Conservation International Brazil (CI-Brazil), suggests. “We need to have a productive agriculture, looking not only at the productivity rates that we have, but also at the dependence on natural resources, in order to maintain a very rich microbiota in the first layers of soil and a long life for this soil”, she adds.

Isabel Drigo, Manager of the Climate and Agricultural Chains at the Forest and Agricultural Management and Certification Institute (Imaflora), highlights the state of Mato Grosso, with “great appetite for productivity”. “There are regions that are being occupied with a desire for exponential productivity, as we see in Mato Grosso. These are regions close to the Amazon, and the producers are willing to ensure that their productivity comes at any cost, as quickly as possible. I note that farmers on this frontier have two characteristics: a desire to have very high productivity rates, but an openness to innovation, and a desire to work with crop-livestock-forest (ILPF) integration, thinking of a long-term balance”, she evaluates.

SUSTAINABLE DEVELOPMENT

Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs

Well-being does not decline over time

Management and improvement of a portfolio of economic assets

TOTAL CAPITAL STOCK

Natural capital (K_n)

Physical capital (K_f)

Human capital (K_h)

Low levels of sustainability

Every K_n is non-essential

K_n can be replaced by K_f and K_h .
Therefore, K_n maintenance is not essential.

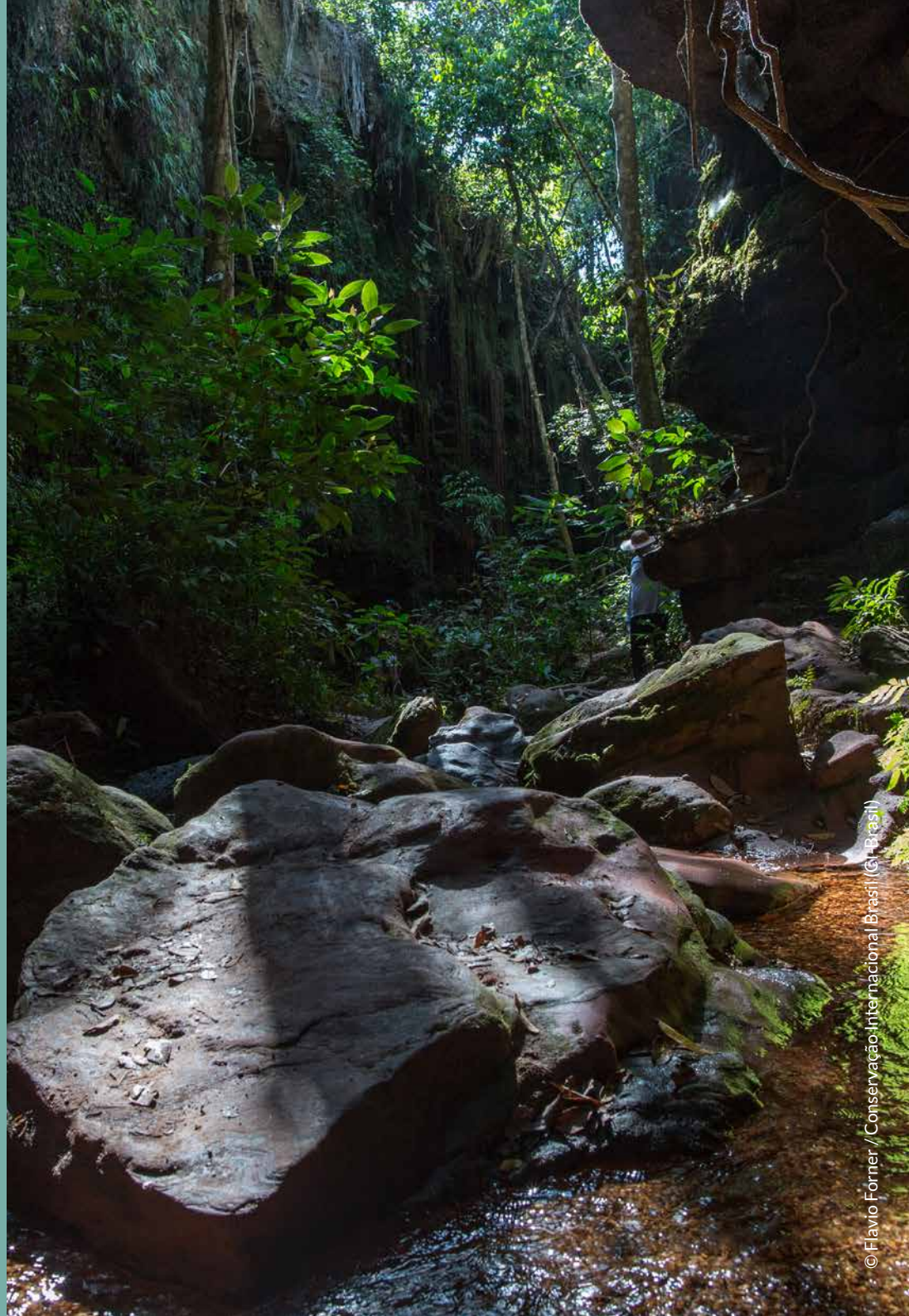
High levels of sustainability

Many elements of K_n are essential

K_n needs to be maintained because:

- imperfect replacement
- irreversible losses
- uncertainty about values

Source: Barbier (2003); Andrade and Romeiro (2009).



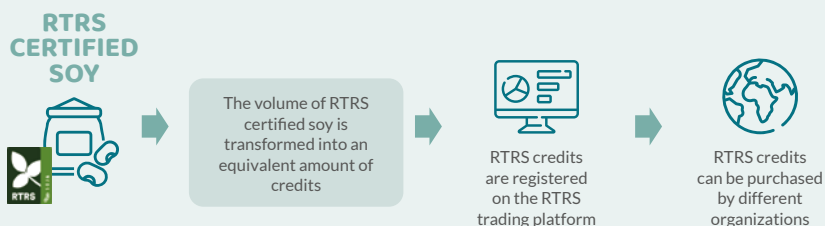
CERTIFICATIONS AND ZERO ILLEGAL DEFORESTATION

The Brazilian Cerrado, where MATOPIBA is located, still needs to make progress on the commitment to zero illegal deforestation. That is what Drigo highlights. The researcher explains that large companies accept eliminating illegal deforestation. Producers who still have great resistance to implement sustainable strategies will continue to make a commitment with the company not to open new areas and deforest them for agriculture and other activities. However, Drigo points out that there is still no product certification for the Cerrado, which makes the situation somewhat more challenging. “In the Amazon, when it comes to soy, for example, there is a very small volume of RTRS [Round Table on Responsible Soy Association]. This certification system doesn’t make much difference in the market yet, but it is the one that exists today. Imaflora has been working on the goal of zero illegal deforestation in the Cerrado. It is important to move forward with the elimination of illegality first”, she comments. For the expert, the expectation is that companies can become more involved in the process, to the point where a trader requires their suppliers not to remove any more trees from the vegetation. “The trader will have to have a satellite monitoring system, but also a documentary one,” she adds. It is a process of educating producers in the continuous observation of current legislation, together with best practices that allow for a sustainable, productive and lasting approach to natural capital.

How does RTRS certification work?

In order to obtain the RTRS responsible soy production certification, producers must comply with 106 mandatory and progressively implemented indicators, gathered in five criteria:

- Legal compliance and good business practices
- Responsible working conditions
- Responsible community relations
- Environmental responsibility
- Good agricultural practices



Source: RTRS. Available at: <https://bit.ly/3BTdKMD>.

The production of RTRS certified soy continues to grow around the world. Last year's global balance confirms this trend. In 2020, the sector produced 4.6 million tons, compared to 4 million tons of certified grains harvested in 2019. In 2020, Brazil stood out, which led this ranking, with approximately 3.7 million tons of certified soy¹⁰.

10. Available at: <https://bit.ly/2Vu1hGt>.

CHALLENGES FOR SOYBEAN

The global demand for soy is enormous, with a tendency to increase in the coming years. Producers need to move beyond purely economic reasoning and consider environmental logic. It is necessary to look ahead, whether to have water or to assess climate variation. “If there is no calculation for the future, the payment is already overdue”, Drigo warns. As an alternative for this future, there are ecosystem services. Booklet 9 explains what ecosystems services are and discusses Payments for Environmental Services (PES). For those in the field, the challenge is real. Although institutions and consultancies calculate the potential of stored carbon and there is awareness that this should be valued, the producer ends up not seeing the money “in their hands”. That is, it is not a tangible calculation for these people. If knowledge reaches producers, whether through technical assistance or other means, farmers will understand the logic that, in the long run, there will be savings and real profit, not to mention the incalculable gain for the environment. “The opening of an area has to take into account the increased cost for the producer. In that case, they need to think twice. Hence, they see that producing better in less area, with more productivity and conserving the soil, is more profitable in the long run”, Drigo explains.

Vendrametto, from CI-Brazil, agrees and highlights the good agricultural practices that bring a more conscious form of production, but which do not have a large adherence still. ILPF, always cited as a viable path to a productive and sustainable field, enables balance and diversity, for example. “It is a much more balanced cycle, because the by-product of a crop or livestock is used, and this cycle is not broken”, Lilian explains.

Technical assistance as a strong ally

The Technical Assistance and Rural Extension (ATER¹¹) services are a great opportunity to bring information to the farmer and promote the adoption of tech-

11. Translator's note: “Technical Assistance and Rural Extension” services are referred as ATER in Brazil. Through these services, public and private institutions provide producers with trainings, field excursions and even equipment and inputs. “Rural Extension” could be translated to “Rural Outreach”.



nology in the production system. However, technology can enable producers to increase productivity or modernize their crops only if it is suitable to the soil and climate. The consulted experts defend a public and high-quality ATER, with well-trained technicians to develop activities based on science. Appropriate training enables those who support the producers to replicate good sustainable management practices and make themselves understood by combining high productivity with environmental goals that preserve the natural capital. For the producer, in general, it is difficult to understand that, in order to maintain high productivity at any cost, incalculable environmental costs or irreversible environmental damages are implied.

“We are still using the Green Revolution package, which is the agrichemical package¹². It’s already something for soybean, especially for the seeds, which are increasingly resistant to drought. There are people who believe that seed improvement alone, or more pesticides, will solve the problem”, Drigo explains. It is necessary to include the analysis of the soil and its suitability, the nutrients needed to maintain that crop in that territory, among many other specificities. “The challenge is to overcome technical and technological myopia”, Isabel sums up.

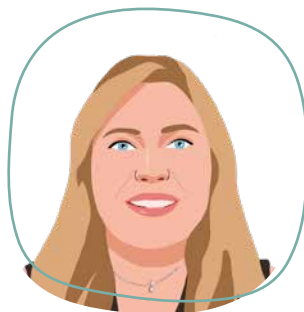
AND THE GENDER ISSUE?

As noted in other booklets of this series, the consulted experts agree that, on small farms, it is increasingly common to have women, mothers and daughters, occupying spaces previously dominated by men.

“We realized that women often manage resources on the property, manage input purchases and even commercialize the harvest. I’ve noticed, in several courses I’ve taught, the growing participation of women to learn how to use spreadsheets, understand the basics of costs, planning and financial management. This is often ‘the leap of

12. Green Revolution was the name given to the transformations that took place in the way agriculture was practiced from the 60s onwards. With the goal of producing more food to end hunger in the world, Green Revolution strategies are also known for their high use of agrichemicals.

the cat¹³, making women really understand how they can better market what is produced and value the exchange between neighbors too ('Oh, you help me plant corn this week and we quantify it in working hours. I pay you for the produce from my garden. Or do you help me with this cassava crop and I'll help you dry the coffee on the terrace?'). They always want to learn."



Lilian Vendrametto

Women seem to have a feeling, a perception of how to manage financial inflows and outflows in a property. They can see the improvements that need to be made, knowing the right time to buy the inputs to produce and the best ways to sell. "Women are multitasking, and often multi-dynamic when they take on property management. I've seen very interesting success stories, especially in this group of small producers... small and sometimes medium producers too", Vendrametto points out.

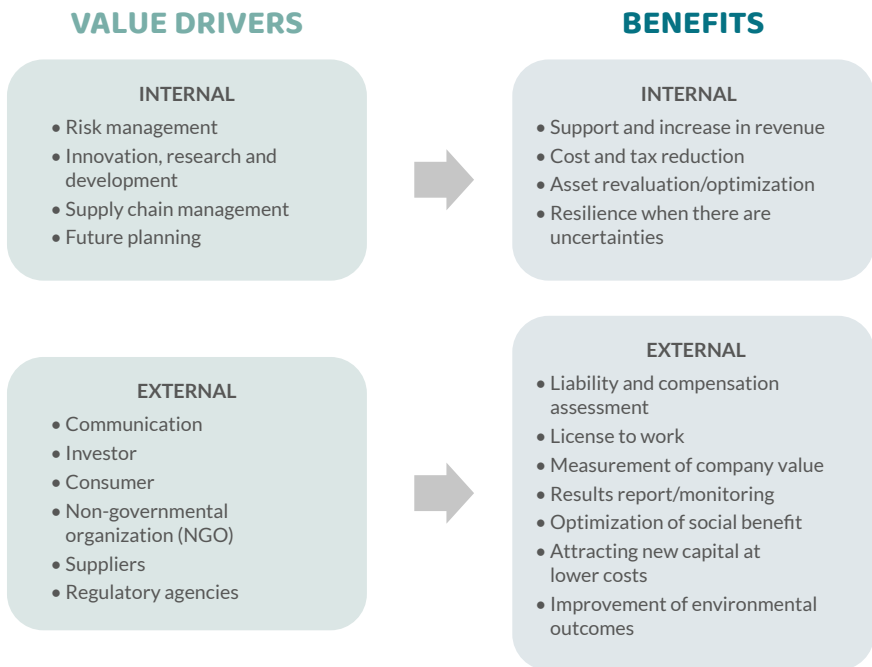
However, Drigo adds that the challenges are still significant, especially because there are no objective and concrete conditions for the involvement of women in some productive chains in the most commercial part. Soy, which is highly technified in large properties, still does not allow for such an outstanding female participation. "We can even find more women working on these farms as technicians, agronomists, harvester pilots, etc. But not ahead of the business, as the big wig, who will negotiate prices with traders, who in turn, are also mostly men", the expert says.

13. Translator's note: "The leap of the cat" (or "the cat jump") is the literal translation of a popular saying common in Brazil. The equivalent saying in English would be "an ace up one's sleeve".

WHERE WOULD THE CHANGE COME FROM?

Sooner or later, the use of the environment as a source of resources and a sink for waste will have to be reassessed. The scale of economic activity will have to be rethought in order not to exploit natural resources above their capacity for regeneration and not to emit waste above their capacity for assimilation. Therefore, for the economic scale to continue growing through the intensive use of natural capital – which is declining – it is essential to invest. As the ability to recreate natural capital is limited, such investments will have to be indirect. It is necessary to conserve what still exists, expand what can be cultivated and increase the efficiency in the use of natural resources.

Figure 1 - Value drivers and expected benefits of natural capital management



Source: Scialabba (2015).

What is needed in the field is collaborative work, a joining of efforts. Companies, together with the Government, in its three spheres, Federal, State and Municipal, can play a decisive role in helping to improve the means of production and the expansion of sustainable agricultural technology on a large scale. “We have a false notion that all soy producers are highly technified, and that’s not the case. We need this conjunction between private policy and public policy working in the productive chain. We also need pressure from the outside because this helps to push the process and move important stakeholders”, Drigo says. She also emphasizes that it is necessary to redirect capital flows, that is, for capital to get where it is really needed.

As for Vendrametto, working with local leaders is also a highly change-promoting factor, which is to bring innovation to small rural producers. “It’s an opportunity to exchange experiences between neighbors. It is often a matter of fostering a more careful look, focused on change, the improvement of the process, as there are always more efficient ways to carry out our activities, including everyday ones”, she concludes.



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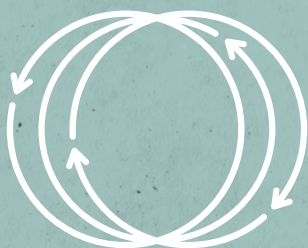
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GOOD GROWTH PARTNERSHIP





TRADITIONAL COMMUNITIES AND FAMILY AGRICULTURE

The contribution of traditional communities and
family farming to biodiversity conservation



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PHOTOS

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TRANSLATION

Matheus Sanitá Lima

1st edition

This series of booklets “Gender perspectives for sustainable production in MATOPIBA” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the Brazilian rural environment even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF¹ –, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

This booklet brings the topic **Traditional Communities and Family Farming: the contribution of traditional communities and family farming to biodiversity conservation**. Agricultural frontiers in Brazil have expanded not only over native vegetation, but also over traditional communities and family farmers with livelihoods that are dependent on the biodiversity of the region. How was the expansion of the agricultural frontier in MATOPIBA? How are traditional peoples adjusting to the arrival of migrants from other regions of the country? What are the elements that contribute to a virtuous relationship between locals and newcomers? How are women from traditional populations contributing to the development of MATOPIBA? These are some of the guiding questions throughout this publication. The experts **Aurenilde Santos**, **Ellen Acioli** and **Isabel Benedetti Figueiredo** contribute with their perspectives and perceptions.

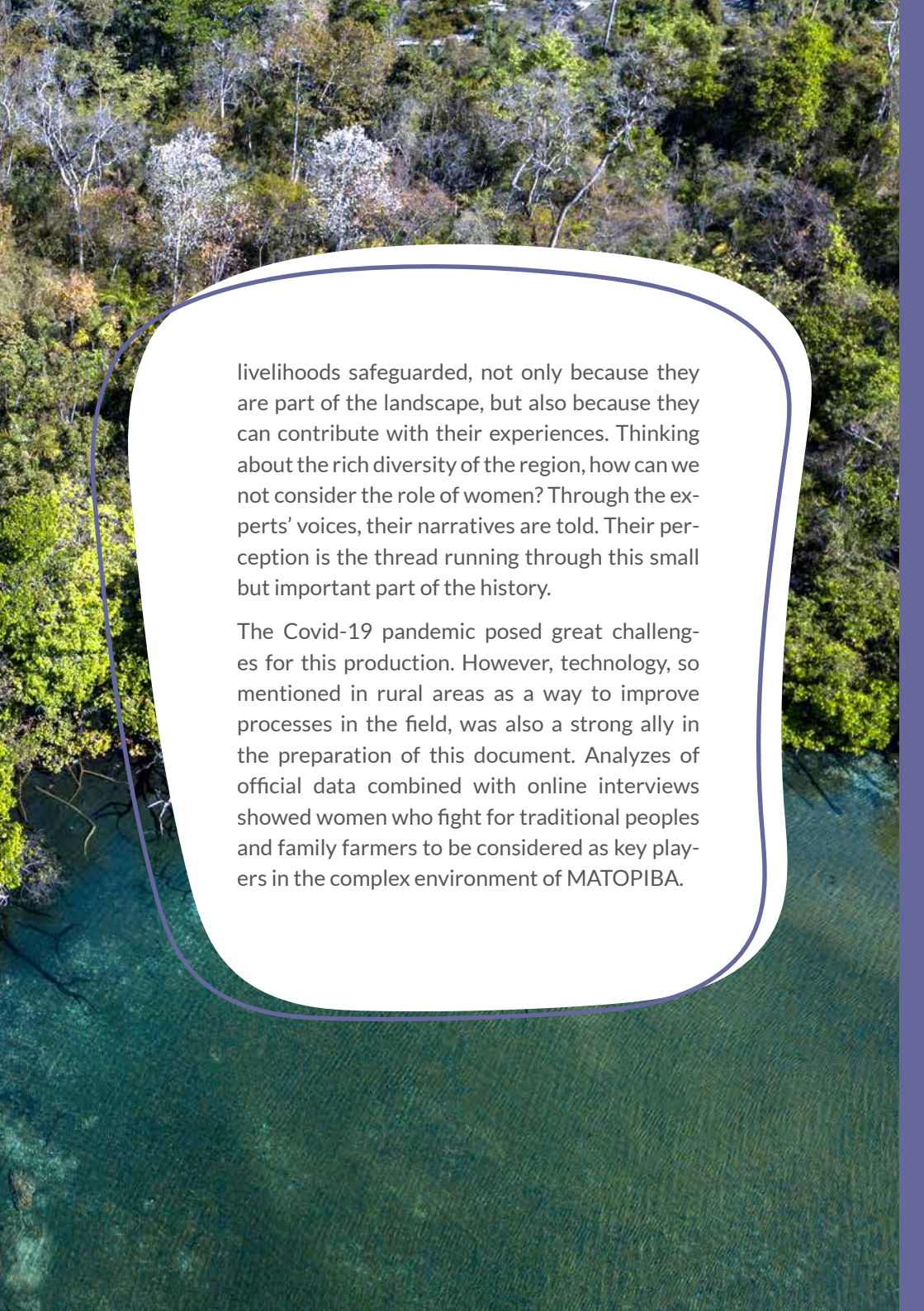
Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.

An aerial photograph of a dense tropical forest with a variety of green and yellow foliage. A white, rounded rectangular text box is superimposed on the center of the image. In the bottom right corner, a small portion of a river or lake with dark water and rocky banks is visible.

INTRODUCTION

This booklet analyses traditional peoples and family farmers from a gender perspective. Talking about these populations is a great challenge for Brazilian agriculture. Based on the experts' narratives, the main topics associated with being at the center of the agricultural frontier, a place of expansion and innovation, are presented. How local populations organize themselves to continue to perform important social, cultural and environmental functions in MATOPIBA – Maranhão, Tocantins, Piauí and Bahia - is also discussed. When thinking about sustainable production alternatives in the region, especially in the case of soy and beef cattle, traditional communities and family farmers must have their territories and

An aerial photograph of a lush, dense forest with a variety of green and brown trees. In the foreground, there is a body of water with a greenish-blue hue. A white, rounded rectangular box with a dark blue border is superimposed on the image, containing two paragraphs of text.

livelihoods safeguarded, not only because they are part of the landscape, but also because they can contribute with their experiences. Thinking about the rich diversity of the region, how can we not consider the role of women? Through the experts' voices, their narratives are told. Their perception is the thread running through this small but important part of the history.

The Covid-19 pandemic posed great challenges for this production. However, technology, so mentioned in rural areas as a way to improve processes in the field, was also a strong ally in the preparation of this document. Analyses of official data combined with online interviews showed women who fight for traditional peoples and family farmers to be considered as key players in the complex environment of MATOPIBA.

AURENILDE SANTOS



Life in the rural area has always been a part of Áurea, as she likes to be called. She spent a good part of her childhood in the countryside and began, from an early age, to act in social movements. Later on, she started working with unions and collectives of rural workers. She is a brigade member of the Formosa do Rio Preto Forest Fire Fighters Association (Aciforp), in Bahia. She is also part of another pro-culture organization, linked to the women's movement, with great proximity to the Geraizeiras communities of Alto Rio Preto, which works with women in the golden grass handicraft, extractivism and family farming.

Born and raised in the Amazon, she left her land at the age of 20 to study. She has a degree in Biology from the Federal University of Goiás (UFG), with a master's degree in Ecology and Conservation from the Federal University of Pará (UFPA) and specialization in Sustainable Projects and Climate Change from the Federal University of Paraná (UFPR). She is currently a special doctoral student in society, nature and development in western Pará, where she conducts research on environmental conservation and gender. She is the Co-founder of the Association of Suraras Indigenous Women of Tapajós. She is part of the Climate Observatory's Gender and Climate working group. She was part of Conservation International Brazil (CI-Brazil), working with support and development of non-timber production chains.

ELLEN ACIOLI



ISABEL BENEDETTI FIGUEIREDO

An ecologist from the São Paulo State University (Unesp), Isabel holds a master's degree in Ecology from the University of Brasília (UnB). She has always worked with the sustainable use of products from the Cerrado along with traditional peoples and family farmers. She has been coordinating the Promotion of Ecosocial Productive Landscapes (PPP-Ecos) program for fifteen years, an independent fund to support community-based initiatives, with a strong focus on the Cerrado.



MATOPIBA AND ITS TRADITIONAL COMMUNITIES

"I started in the Geraizeiras² communities, a people who are up there protecting, caring. To me, in a way, they are guardians of the waters."

Aurenilde Santos

The traditional communities in MATOPIBA are very old. Naturally, the Indigenous peoples are natives and the first owners of the Cerrado. Between the new and the old owners, there are different purposes for the land and what is on it (fauna and flora). Talking about traditional communities in the great agricultural frontier called MATOPIBA is intrinsically talking about great challenges: recognizing identities, respecting who has always lived in the region and combining all of this with new sustainable forms of production.

The continuous area of the Cerrado, from the central plateaus of Brazil, has a current Indigenous population of approximately 44,118 inhabitants, distributed mainly in the states of Maranhão, Tocantins, Goiás, Mato Grosso and Mato Grosso do Sul. This population comprises 26 peoples with different cultural characteristics, whose current situation and demographic fragmentation do not reflect the importance that the Cerrado had in their fixation, nor the form of occupation of this space by such population³.

Across the entire Brazilian territory there are no population gaps. Even where official data do not show it, there are communities that use landscapes to reproduce their cultural practices. In the Cerrado, these regions are used by traditional communities for the collection of fruits and medicinal plants, for the

2. Geraizeiros are the populations that inhabit the general fields in the north of the state of Minas Gerais.

3. Barbosa (2011, p. 11)

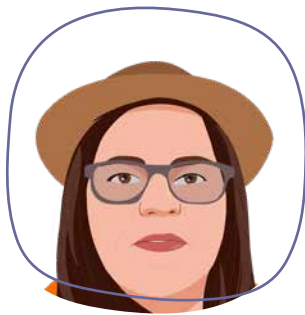
release of cattle, for gardening, and hunting. The communities that inhabit the biome today are still very unknown. As shown in the introductory booklet of this series, research that maps these population groups in the Cerrado is still in its infancy. However, they are initiatives that seek to give a face, voice, and identity to these thousands of people. “In one year of work, we have increased by 3.5 times the number of rural communities registered for a region of Brazil that covers a large part of MATOPIBA. Official data from the IBGE [Brazilian Institute of Geography and Statistics] still cannot reflect the reality of many of the villages, towns, communities, and locations”, the expert Isabel Benedetti Figueiredo explains. She points out that, although the acronym MATOPIBA may seem new, it is an area well known by many traditional communities and peoples. The researcher sees that there are joint efforts of a large group of in-



vestors and agribusiness stakeholders to bring about development in the area. But, MATOPIBA has the largest remnant of native vegetation in the Cerrado, as the central-south part of the biome has been converted into pastures and crops since before the 60's. Many areas in the MATOPIBA are traditionally used by communities of the most varied types of identity that do not necessarily have political organization, influence and knowledge about their rights. "The issue of gentrification⁴ goes hand in hand with real estate speculation. So, it also works in the same logic of denying identity: if you deny it, you work in a way of not recognizing the territory as Indigenous territory in order to have easier access to these lands", Ellen Acioli points out.

The core of the problem lies in the difference between worldviews: Indigenous peoples question the idea of non-indigenous development that promotes activities solely based on the expansion of (monetary) capital. There is also the point of view [of original peoples], in which the cosmovision⁵ is based on the relationship with earth, that is, it presupposes another way of understanding life. Aurenilde Santos, who is part of one of these communities, talks a little about the impact.

"The expansion of agribusiness in our region has a direct impact on the Ge-raizeiras communities of Alto Rio Preto. We have a lot of challenges in our community. Challenges around agrarian issues, which involve the purchase of land towards areas traditionally ours, communities and water guardians, but also of those who take care of nature and make their subsistence agriculture, their family agriculture."



Aurenilde Santos

4. Urban transformation process that "evicts" residents of peripheral neighborhoods and transforms these regions into prime areas.

5. Indigenous experiences and knowledge consider the universe in its entirety and place the human being in a complex network of relationships that involve beings, natural and supernatural, integrating life as a whole. These cosmologies are not confused and cannot be contained within the materialist and market logic, with which we are used (Bonin, 2015).

The demarcation of Indigenous lands is a complex problem. Many times, this demarcation produces “islands”, that is, small Indigenous areas surrounded by farms, conservation units or public areas. The expansion of these territories, which would guarantee the physical and cultural survival of Indigenous peoples, is understood to be an obligation of the State, according to the Federal Constitution of 1988⁶.

Popular and local knowledge is validated after having been widely used for traditional peoples to live in extremely sensitive biomes. Concepts around nature conservation; the decision-making autonomy of families; and the production with little or no use of chemical inputs are developed through the practices of traditional communities.

This way of life is opposite to land occupation based on the intense use of modern and large-scale inputs associated with monoculture (discussed in booklets 2 and 4 of this series). Traditional communities and family farming have a way of producing that naturally fits into various protocols for the management of natural capital (discussed in booklet 7).

The existence of traditional populations in MATOPIBA represent an important counterpoint to the concentration of land, making them political and social protagonists. In addition, traditional forms of production can contribute to make the landscape of monocultures more diversified. Above all, they are locus of social and environmental resilience.

6. Bethonico (2021).

Traditional communities and family agriculture

Traditional peoples and communities are culturally differentiated groups that recognize themselves as such, have their own forms of social organization and occupy and use territories and natural resources as a condition for their cultural, social, religious, ancestral and economic survival, using knowledge, innovations and practices generated and transmitted by tradition (Decree no. 6.040/2007, art. 3, item I).

The Indigenous and traditional peoples of the Cerrado are the contemporary heirs of this long history. They represent the biome's socio-diversity and at the same time are the guardians of the region's ecological and cultural heritage⁷.

Sustainable use is opposed to traditional agriculture, which compromises the maintenance of natural resources.

Rational use stems from the need to reflect on the practices of traditional empirical knowledge, based on knowledge and technical information⁸.

Family farming and extractivism are important allies in the conservation of agroecosystems. These allies form productive landscapes that ensure the continuity of environmental services (the maintenance of biodiversity, hydrological cycles and carbon stocks) provided by the Cerrado⁹.

7. ActionAid (2017).

8. Available at: <https://www.icmbio.gov.br/portal/populacoestradicionalis>.

9. ActionAid (2017).

THE CHANGE OBSERVED OVER THE YEARS

*"It's not worth it for you to
lose your land, for you to
lose your clean water, so that
youth have CLT¹⁰."*

Isabel Figueiredo

In MATOPIBA, land occupation processes are multiple, complex, and run in parallel. "What catches my attention the most are processes of expropriation and disrespect for rights", Figueiredo emphasizes. In the western region of Bahia, there is some occupation of public lands, a lot of violence in the countryside, and some farms that are quite large. In the region of Correntina, in the same state, the main issue is the use and possession of rivers: grants for the use of water on a large scale, such as some properties that consume sixty times more water than the entire population of the municipality.

There is also the role of the community itself, as a form of subsistence, as Figueiredo explains: "There are some young people from these communities who provide services to the farms. They work during the harvest season to get extra money". However, a systematic inclusion process that could combine knowledge and interests to empower the youth and others in the communities do not exist. Usually, the harvest season offers just manual jobs, such as machine operator, weight loader, and mixer of agricultural pesticides. "There is no effort for the community to be included, even because locals are not interested in it. They are interested in continuing their way of life. The community wants to work through occupations that do not contaminate the soil or wa-

10. Translator's note: CLT stands for "Consolidação das Leis do Trabalho" or "Consolidation of Labor Laws" decree. The decree was issued by Getúlio Vargas, President of Brazil, in 1943. CLT unified all labour regulations and provided for workers' right in the Brazilian constitution. Currently, CLT is colloquially used as a synonym of "formal employment contract". "To have a CLT" means to have a formal employment contract.

ter, nor take away their productive land”, she analyzes. In the end, the expert points out, “it is not worth it to eliminate a series of benefits for (and from) the environment just so one has a formal employment contract”.

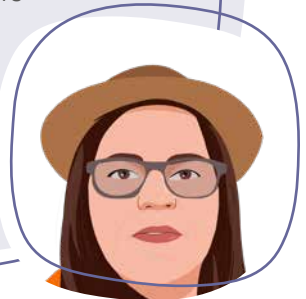
Aurenilde dos Santos sees that the expansion of agribusiness has generated the need for traditional peoples to unite and fight for their rights. She also highlights that the participation of third sector organizations and the implementation of projects in the area were fundamental to support different communities to defend their territory. “I believe that the people were trapped, the right to come and go was compromised”, she says. “For example, there are several villages that are not always able to pick up the golden grass collected by women from other communities because of transport obstacles. Why? Because it’s trapped there, there’s a fence, guards, surveillance”, she analyses.



Community stories

"I was talking to the lady who is a leader there in Formosa do Rio Preto [in the state of Bahia], and she said: 'People who did not want to be Quilombolas, who were ashamed to say they were from Buritizinho, now want be from Buritizinho'. I spoke to her about the issue of self-recognition/identification, as people suffered prejudice when saying where they came from. Now, they are identifying themselves and it's been a process. Currently, no girl is ashamed to say that she is from Cacimbinha, that she is from Aldeia, that she is from Cachoeira, that she is from Marinheiro, that she is from these communities... people are no longer ashamed. Because in the past, for them, saying "I am Geraizeira" was a pejorative statement. I was ashamed to recognize myself as such. I was ashamed to be a Quilombola, to say that I was from the Buritizinho community. Not today – I see people identifying themselves and not being ashamed. A lady from Cacimbinha, Mrs. Clara, artisan, a wonderful person, told us once that she was ashamed to say, because of prejudice, that she was a Geraizeira. She then said that she once had the opportunity to go to an event at the Federal University of West Bahia (UFob). When she spoke her name, who was Mrs. Clara from the community of Cacimbinha Alto Gerais in Rio Preto, the entire audience stood up and applauded. She said that, from then on, she became proud, saying to the four corners that she was a Geraizeira. So, this issue of agribusiness expansion served for people to unite and self-identify."

Aurenilde dos Santos



Family farming and extractivism are important allies in the conservation of agroecosystems as they form productive landscapes that allows for the continuity of environmental services provided by the Cerrado. This complex human profile was forged in what is called *homo cerratensis*, “the man of the Cerrado”. Their specific cultural traits must be understood through their long formative process, given the current context of social disaggregation that Indigenous communities and traditional peoples face in the Cerrado¹¹.

Traditional communities form a complex relationship with the landscape and productive activity. Thousands of women (assisted by children) work in the extractivism of *babaçu* in the states of Maranhão, Piauí, Tocantins and Pará. There are about 400 thousand people, almost all of them women, who survive from extractivism, the industrialization of oil and other *babaçu* products. In communities that live off extractivism, it is customary to say: if a woman has not yet been a “coconut breaker”, one day she will become one. This activity is feminine, by tradition, and performed in an artisanal way¹².

Babaçu extraction is an ancient activity of social and economic importance. With the contribution of the political mobilization of organizations representing the peasants, the *Babaçu* Study Group was created in 1957, with the purpose of presenting suggestions for the development of *babaçu* production¹³. Over the decades, several groups have emerged to defend *babaçu* producers and *babaçu* territories linked to unions, social movements and the church. In 1990, the Interstate Movement of *Coco-Babaçu* *Quebradeiras*¹⁴ (MIQCB) was created and, in 2002, the Association of the Interstate Movement of *Coco-Babaçu* *Quebradeiras* (AMIQCB) was founded, forming an organization of peasant women that came together based on the struggle to defend the environment. They campaigned for the agro-extractivism of *babaçu* and the preservation and free access to *babaçu* trees. Through political and legal struggles, they formed cooperations along with an institutional organization comprising the states of Maranhão, Piauí, Pará and Tocantins. They even launched a specific proposal for legislation (*Lei Babaçu Livre*)¹⁵.

11. Barbosa (2017).

12. Available at: <https://persquisaescolar.fundaj.gov.br/pt-br/artigo/babacu/>

13. Rêgo and Andrade (2005).

14. Translator's note: “Coco-babaçu quebradeiras” translates to “babaçu-coconut breakers”.

15. Rêgo and Andrade (2005).

The conflicts in the region between locals and the new occupiers are related to several elements, including the valorization of land. There is also a conflict in the institutional structure around the documents that guarantee the property right to newcomers¹⁶. The squatters, who lived in vacant lands, inhabited (and still inhabit) the areas called Baixões. Rivers flowed through plateaus and locals could be supplied with water and fish; they built their houses; grew crops (cassava, rice, corn, beans); had pigs, chicken, etc. The Chapadas were part of unoccupied areas, with an intermittent water regime, not allowing housing, but rather cattle raising, hunting, and the collection of fruits and medicinal roots. The relationship between the common lands of the Chapadas and the occupied areas in Baixões was what allowed the life of these squatters¹⁷.

16. Soares (2009, p. 86) Soares (2009, p. 86)

17. Alves (2006); Soares (2009).



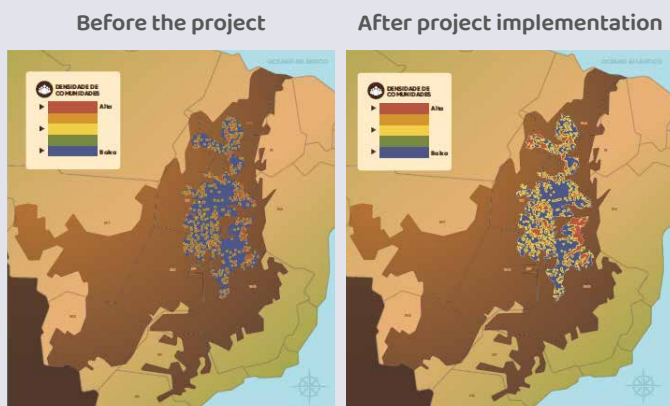
Why traditional communities must be mapped

There is still no exact number of how many traditional peoples and communities exist in Brazil. The Amazon Environmental Research Institute (IPAM) and the Society, Population and Nature Institute (ISPN) are non-governmental organizations (NGOs) that have contributed to the registration of these groups, through the “Tô no Mapa” app. The app allows traditional communities and family farmers from all over Brazil to self-map their territories.

The number of communities mapped by the project was 3.5 times greater than the communities present in official surveys. The map below shows the density of communities at the beginning and at the end of the project. The color range represents the number of communities in the region.

The mapping of traditional communities is an opportunity to increase the knowledge of their own members. “It is interesting to ask the youth and people who do not know the entire territory to carry out the mapping. This can generate a greater sense of belonging and a greater interest in taking care of the territory¹⁸.”

It is an opportunity for the community to talk about territorial planning, population growth and the degradation of rivers, forests, and ecosystems. The community, with these data, can debate their actions, such as the family use of natural resources. They can also analyze whether new community agreements are needed so that families can continue to inhabit that space for a few more generations.



Source: Ipam, 2020.

Note: Image identical to the original (in Portuguese).

18. Available at: <https://bit.ly/3lhVfld>.



Land regularization: complex and necessary

The agrarian reality of MATOPIBA is complex and deserves special attention from public and private agents. The legally assigned areas – Quilombolas lands, Indigenous lands, rural settlements and federal and state conservation units – add up to 0.3%, 5.7%, 5.1% and 12.1% of the territory of MATOPIBA, respectively¹⁹.

Table 1 - TOPIBA: legally assigned areas and territories (2014)

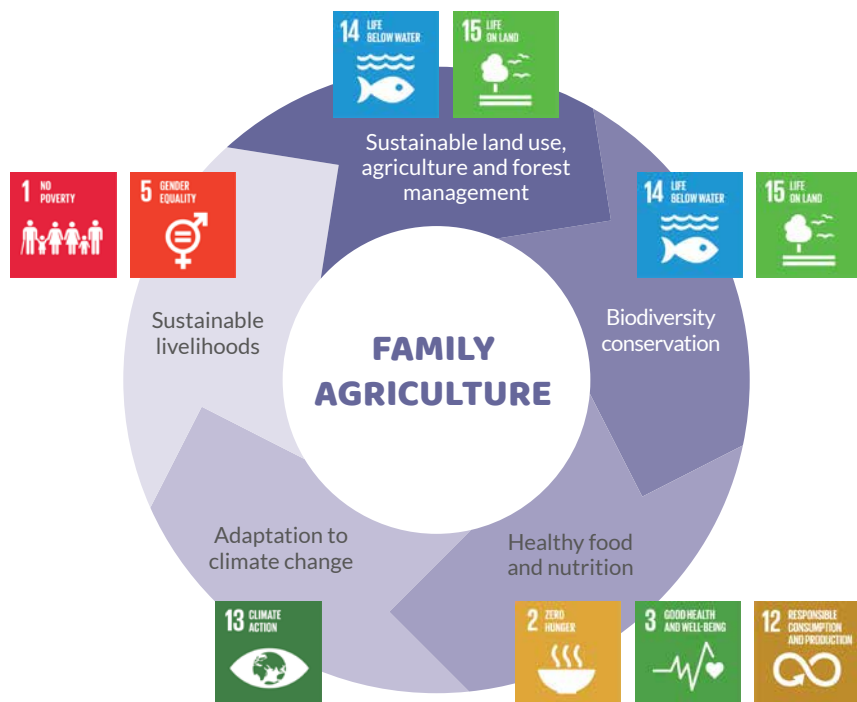
Types of land	Number of units	Area (ha)	Area/MATOPIBA (%)
Conservation units	42	8,838,764	12.1
Indigenous lands	28	4,157,189	5.7
Rural settlements*	865	3,706,699	5.1
Quilombolas	34	249,918	0.3
Other areas	-	56,220,915	76.8
MATOPIBA area	-	73,173,485	100

Source: Fonseca and Miranda (2014).

*Approximately 100,000 families.

19. Bolfe et al. (2016).

Figure 1 - Relationship between family farming and the Sustainable Development Goals (SDGs)



Source: Pereira (2019).

WOMEN AND THEIR ORGANIZATIONAL POWER

As shown in other booklets of this series, women have a strategic role in society. They have a form of organization that differentiates them from men by thinking about the medium and long term. “We see in some production chains, in Europe and Africa, for example, that women have a great sense of organization, also defined socially and culturally. We are taught to take care since we were children”, Ellen Acioli observes. Because of these characteristics, women end up having a more empathetic bias towards inclusion. This is expressed in

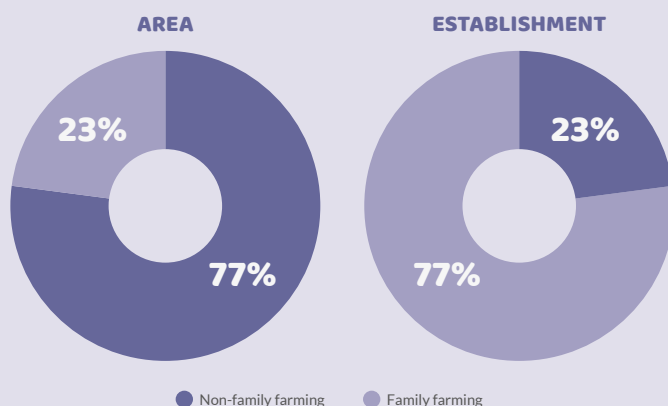
the leadership of various organizations that operate in different territories, whether on environmental issues or the protection of rights. Therefore, it is necessary to give women visibility and value their role, opinion and experience. “We have to really fight for equity, equality and inclusion. We all have the same duties and rights, including the right to occupy any position, without being judged or subjugated by a gender identity issue”, the expert defends.

Quilombola communities are, for the most part, matriarchal. In Jalapão, for example, women account for most of the leaders. The babaçu-coconut breakers alone are 450 thousand and are organized through a movement that goes from Pará to Tocantins, Piauí and Maranhão. “I don’t know whether who formed their small property was a man, but women are the ones who are going to the union meeting. These data reflect reality then”, Isabel Figueiredo says. However, women’s participation varies greatly and depends on the purpose. Settlements that have livestock as the main income source also have a male-dominated culture. Still, women are starting to organize themselves at home to develop projects and the consulted experts have seen several initiatives to implement some of these projects. All of this tends to cause discomfort for men, even though these initiatives can provide women with financial independence. “Women usually maintain a greater desire for change, agitation, and innovation. They are the ones who take the initiative to use the fruit that was about to be wasted. They make fruit pulp and jelly and sell vegetables as well”, Figueiredo affirms.

In the countryside, Aurenilde sees all this protagonism expressed, above all, in family farming. In the case of buriti and pequi, for example, “we do not have women out of family farming, who are perform activities activities other than extractivism, handicraft of golden grass, and buriti fiber”, she reveals. This shows that women still face significant challenges to grow and maintain themselves.

Family and non-family farming

Graph 1 - Proportion of areas and number of establishments



Source: IBGE (2019).

Family farming occupies **12.5 people/100 ha**

Non-family agriculture occupies **1.8 people/100 ha**

Table 2 - Brazil: employed people and employed people/area in different establishment types (2017).

Type of establishment	People	People/100 ha
Family farmers	10,115,559	12.5
Pronaf* Group B	6,687,469	16.1
Pronaf Group V	3,324,838	8.8

(Continued on the next page)

(continuation)

Type of establishment	People	People/100 ha
Out of Pronaf	103,352	6.9
Non-family farmers	4,989,566	1.8
Brazil	15,105,125	4.3

Source: IBGE (2019).

Elaboration: Del Grossi (2019).

Note: Pronaf - National Programme for Strengthening Family Farming

Family farmers produced an average of R\$132/100 ha, practically the same as non-family producers (R\$133/100ha).

Table 3 - Brazil: production value and average productivity/ area of different establishment types (2017)

Type of establishment	Production value (in billion R\$)	Value (R\$/100 ha)
Family farmers	106	132
Pronaf Group B	13	31
Pronaf Group V	74	196
Out of Pronaf	19	1,297
Non-family farmers	359	133
Brazil	465	132

Source: IBGE (2019).

Elaboration: Del Grossi (2019).



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FUTURE: WHO IS RESPONSIBLE FOR IT?

"I think one way is for us to think about land use and occupation."

Ellen Acioli

Traditional populations must pay special attention to territorial planning and management. Women, especially, play an important role in the stability of these families, as well as in production. They are responsible for backyard agri-

culture, which is based on diversification and provides the livelihoods of small producers and their communities. An important ecological movement orbits around women to resist the monotony of the landscape, which translates into protecting natural capital in its most diverse forms. Private actions, NGOs and the public sector must consider gender planning and address short- and long-term needs.

Many of these traditional rural communities are ecological producers connected with great international movements for the preservation and valorization of their populations: “(...) agroecology is a productive and life practice, (...) in opposition to conventional farming and to large-scale production centered on the use of chemical inputs and mechanization”²⁰.

For the consulted experts, it is essential to design tools for the use and occupation of land, whether through ecological-economic zoning or a master plan. “It means adding all the stakeholders and considering the social, economic, cultural and environmental territorial dynamics of everyone who uses a certain territory. Understanding expectations and setting limits. Reaching a consensus, knowing that at the negotiating table each one will have to give in a little, as long as rights are protected and the process is inclusive”, Ellen Acioli evaluates. She believes in the effectiveness of land use territorial development tools as a practice. “Public authorities have to guarantee compliance with these tools as long as the planning has been representative and inclusive, valuing and giving a voice to the different participants in the territory without privileging layers of greater financial influence and political lobbying”, she says.

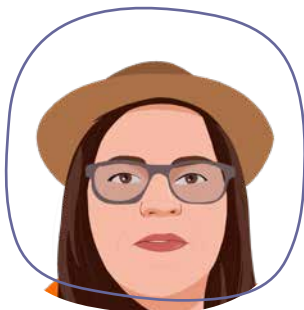
For Isabel Figueiredo, the core of the solution is land regularization. “Once with land security in hands, producers can invest in development, in improvements in the mill, in the flour house and in the purchase of a small truck to transport what they collect in the Cerrado”, she explains. For her, socio-biodiversity production chains are the alternative for income generation and rural development with immense potential.

For Aurenilde, who lives with traditional communities, only education, technical assistance and rural extension can promote a real change of paradigm. This paradigm shift will help to value the knowledge produced by traditional

20. Saquet (2017, p. 82).

peoples in harmony with their territories. It is necessary to understand the cycle of food, of the soil, and of nature itself.

"I believe in the environmental education course, a course linked to the management of golden grass, for example. Today I sell 1 kg for R\$ 20 to R\$ 30. I take the money and that's it. I won't have golden grass to show my grandchildren, and future generations. I say that trees will not be lacking for our generation. What about the future ones? I speak, for example, of brazilwood: we learned in the history book what Brazilwood was, but I don't know it myself. I think the fruit has to be taken at the right time"



Aurenilde Santos

Traditional knowledge can offer new ways to maintain a more balanced and harmonious relationship with the Cerrado. What has been settled by time and experience has been resisting the current technological tide and shows itself to be resilient. Studies and experiences have shown that traditional knowledge is a source of innovation, and it can complement and interact with new technologies. "In this sense, why not learn from the Indigenous people and from so many other traditional communities the knowledge needed to better live and let the Cerrado live?"²¹.

21. Bicalho and Miranda (2015, p. 63).

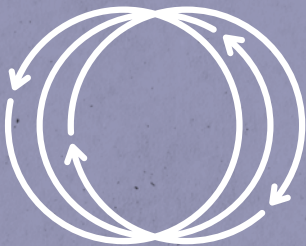
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GOOD GROWTH PARTNERSHIP





PAYMENTS FOR ENVIRONMENTAL SERVICES

Financial incentives for nature conservation



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Brasil

GENDER PERSPECTIVES FOR SUSTAINABLE
PRODUCTION IN MATOPIBA

PAYMENTS FOR ENVIRONMENTAL SERVICES

Financial incentives for nature conservation

Brasília/DF, 2021

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TRANSLATION

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1st edition

This series of booklets “**Gender perspectives for sustainable production in MATOPIBA**” is part of the global initiative Good Growth Partnership, implemented by Conservation International Brazil (CI-Brazil), with support from the United Nations Development Programme (UNDP) and funding from the Global Environment Facility (GEF). In Brazil, the project aims to promote the establishment of sustainable agricultural landscapes that combine soy production and nature conservation in the MATOPIBA region.

PREFACE

Ensuring efficient management of natural resources and maintaining these resources for future generations are just two of the many issues regarding the sustainability of any given agricultural enterprise and maintenance of the general well-being in rural communities.

Discussing the multifaceted roles that women play in the countryside makes the studying of the Brazilian rural environment even more intriguing. More than just gathering numbers, perceiving the local reality from women's point of view brings elements that express a rich narrative of changes in societal structures. Oftentimes, these changes establish new paradigms for a more sustainable agricultural production.

The project Good Growth Partnership, through the Global Environment Facility – GEF¹ –, investigates this intriguing scenario and publishes a collection of ten booklets named **Gender perspectives for sustainable production in MATOPIBA**.

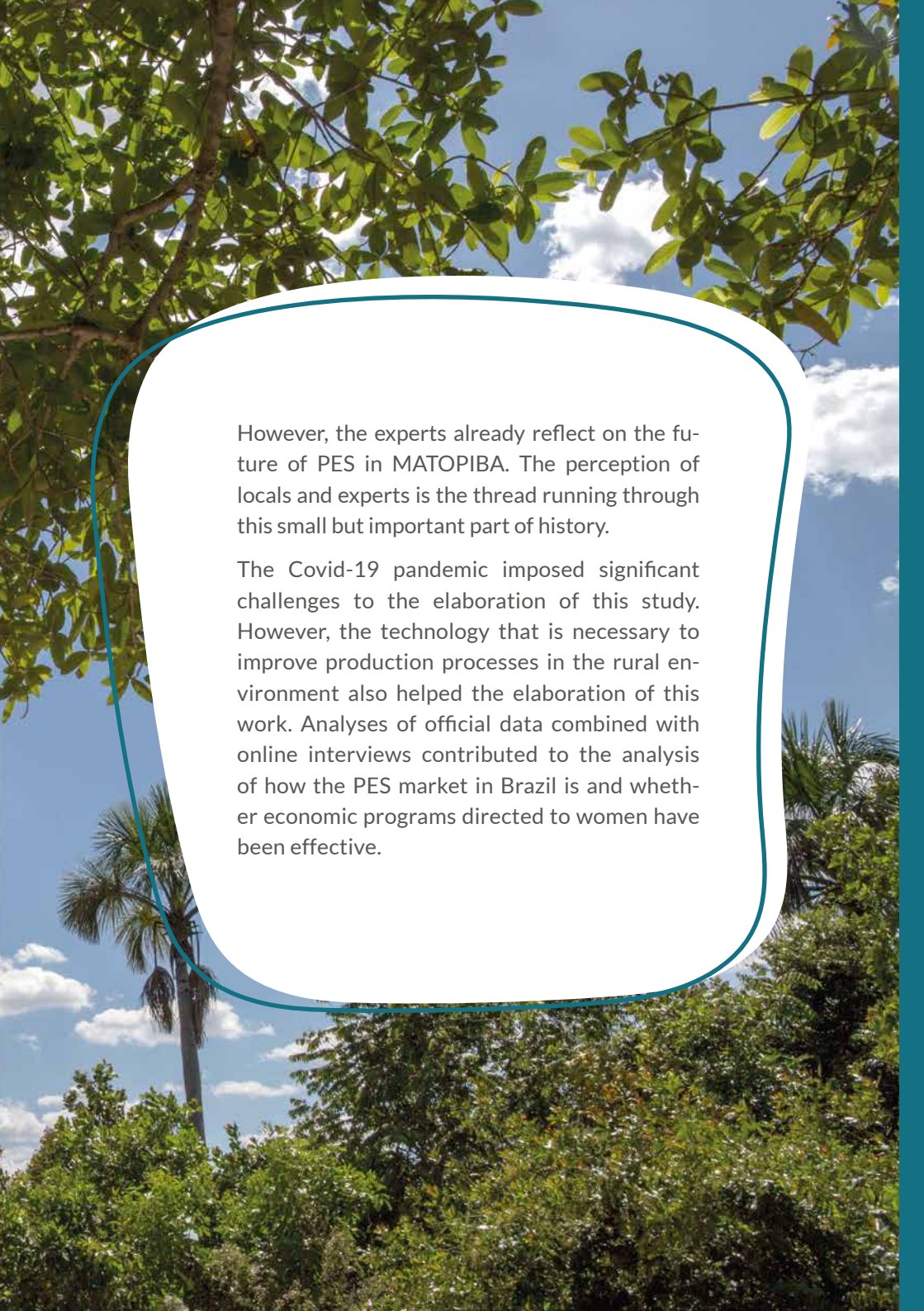
This booklet brings the topic **Payments for Environmental Services (PES): Financial incentives for nature conservation**. What is PES? What is the difference between environmental services and ecosystem services? How can social inclusion be fostered through PES? How does PES fit into the dynamics of the Cerrado? What is the participation of women in the preservation of native vegetation? Throughout this publication, the experts **Laura Antoniazzi** and **Fernanda Macedo** share their perceptions and opinions.

Happy reading!

1. Translator's note: throughout this publication, full names of governmental programs and projects were mostly (i.e., when needed/appropriate) translated to English for the sake of understanding. The respective acronyms and abbreviations were mostly (i.e., when needed/appropriate) kept in Portuguese for the sake of veracity and further reference.

INTRODUCTION

This booklet discusses Payments for Environmental Services (PES) from a gender perspective. The various forms of environmental services are presented. The consulted experts weigh in on the importance of the legal framework for PES and for MATOPIBA itself - MARanhão, TOcantins, Plauí and BAHia. Research carried out with soy producers in this region illustrates what these payments can be like. The experts share their experiences regarding legal security and the challenges of the new law that regulates PES in Brazil. This is a recent topic for the Cerrado, with only a few examples of PES being applied in this biome.

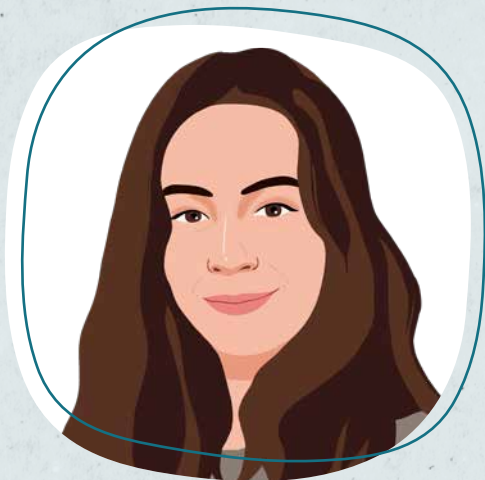


However, the experts already reflect on the future of PES in MATOPIBA. The perception of locals and experts is the thread running through this small but important part of history.

The Covid-19 pandemic imposed significant challenges to the elaboration of this study. However, the technology that is necessary to improve production processes in the rural environment also helped the elaboration of this work. Analyses of official data combined with online interviews contributed to the analysis of how the PES market in Brazil is and whether economic programs directed to women have been effective.

Graduated in Communication and Journalism from the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Fernanda holds a master's degree in Sustainability from the University of São Paulo (USP). Since the beginning of her career, she has worked in communication and sustainability departments, having worked at the FGV Sustainability Studies Center (FGVces) and at large companies in the private sector. Between 2017 and 2021, she acted as communication and advocacy coordinator for the *Coalizão Brasil Clima, Florestas e Agricultura* (Brazilian Coalition on Climate, Forests and Agriculture). She is currently the Communication Coordinator at The Nature Conservancy.

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LAURA ANTONIAZZI

Agronomist from the Luiz de Queiroz School of Agriculture (ESALQ/USP), Laura holds a master's degree in Applied Economics and specialization in Public Management and Sustainable Development from Italy. She is a senior researcher and partner at Agroicone, where she has been working since 2008 with public policy agendas and research focused on agribusiness, governments and multilateral organizations.



WHAT ARE PAYMENTS FOR ENVIRONMENTAL SERVICES?

Sanctioned on January 13th, 2021, the Law No. 14.119 instituted the National Policy on Payment for Environmental Services (PNPSA²) and, consequently, created the legal framework for Payments for Environmental Services (PES). PNPSA is one of the categories and lines of action of the Forest Code (art. 41), in addition to being a strategic instrument for national agricultural and livestock production to reach high levels of sustainability, as it creates a legal environment for PES to develop. However, there are still several challenges, such as quantifying the benefits generated by environmental recovery and preservation (Figure 1) and the regulation of the law. Fernanda Macedo makes an important reflection on the maturation and arrival of this law: “Having a legal basis to make PES start working, also dialoguing with it, shows that PNPSA has arrived at a very favorable time”.¹

Ecosystem services are numerous, and some may be easier to understand than others. The most popular and widespread service worldwide is the regulation modality (Table 1) – more specifically, carbon sequestration, from which the well-known carbon market derives. But there are also other services that involve the maintenance of a landscape, the preservation of water resources, among other social and environmental gains generated by the maintenance of a certain ecosystem.

The agronomist and senior researcher at Agroicone, Laura Antoniazzi, cites the case of a dam that pays producers to preserve vegetation in its surroundings to reduce the risk of silting. “The company has several economic advantages in avoiding erosion. There are already several cases of payments for environmental service arrangements in this model. However, each case is a case and oftentimes a case is not transferable to other areas. In other words, it is the market that necessarily signals the physical characteristics of the PES arrangement, being defined there in that space, in that hydrographic basin”, the expert observes.

2. Translator’s note: throughout this publication, “Payments for Environmental Services” were abbreviated to PES (the Portuguese acronym is PAS). The acronym “PNPAS” was not translated to allow for further reference in original documents.

On one hand, there is the payer (“buyer”) of environmental services (public institutions, civil society or private agents, natural and/or legal persons) and, on the other hand, there is the provider of environmental services (natural or legal person, under public or private law, or family or community group). This “game” of interests constitutes a way of pricing ecosystem services, that is, assigning value to these services³. As foreseen by PNPSA, environmental services are individual or collective activities that favor the maintenance, recovery or improvement of ecosystem services. In turn, PES is a voluntary transaction, whereby a payer (“buyer”) of environmental services transfers financial resources or other form of remuneration to a provider of these services. The PNPSA provides for various types of payments: direct payments, monetary or non-monetary; green bonds; compensation linked to certification of reduced emissions from deforestation; and others.²

3. Faria and Régis (2021).



The rural producer could face two options:

- i) replacement of native vegetation to increase production areas; or
- ii) investing in technologies to increase the productivity of open or degraded areas (as discussed in Booklet 6 of this series).

This last option is advantageous for the producer, as the technology already allows a quick response in production and productivity. This producer could have extra compensation as an environmental service provider as well. PES has the potential to encourage the adoption of better production practices with low(er) environmental impact, reducing pressure on areas with native vegetation and increasing income from the revitalization of areas that have already been opened. In fact, there is a wide range of environmental services that are grouped into four modalities (Table 1), which generate many benefits for society (Figure 1).

Table 1 – Types of Payments for Environmental Services (PES)

TYPE OF PES	HOW IT WORKS
Provisioning services	Services that supply environmental goods or products used by humans for consumption or sale. For instance, water, food, wood, fibers and extracts.
Supporting services	Services that maintain the continuity of life on Earth, such as nutrient cycling, waste decomposition, maintenance or renewal of soil fertility, pollination, seed dispersal, control of potential pests and potential vectors of human diseases, protection against ultraviolet solar radiation and maintenance of biodiversity and genetic heritage.
Regulating services	Services that contribute to maintaining the stability of ecosystem processes, such as carbon sequestration, air purification, moderation of extreme weather events, maintenance of the balance of hydrological cycles, minimization of floods and droughts and the control of critical erosion and landslide processes.
Cultural services	Services that constitute non-material benefits provided by ecosystems, through recreation, tourism, cultural identity, spiritual and aesthetic experiences and intellectual development.

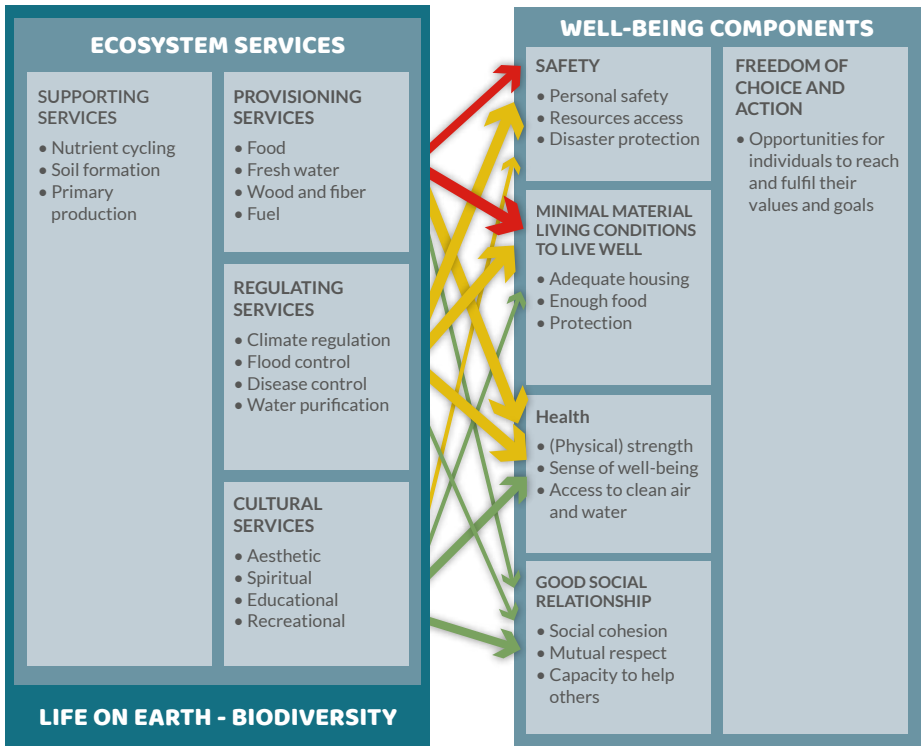
Source: Brasil (2021).

Who is more willing to pay for environmental services?

Much more common in high-income countries, Payments for Environmental Services face an old challenge in Brazil: low income and socioeconomic inequality. "The value of environmental services is estimated differently from services that already exist in established markets", Antoniazzi states. One of the most common examples is that of the owner of a dam who would be willing to pay rural producers around the dam, if they adopted agricultural practices that could prevent erosion of their land and the consequent silting of the lake. "In that space, in that hydrographic basin, the environmental services have all these physical peculiarities", which facilitates the quantification of payment. Even so, the following question arises: "what is paying for an environmental service that is not on the market?". Normally, "maintenance of landscapes and biodiversity is much more difficult to quantify [their value] and to turn them into a metric unit that is easy to transact". Antoniazzi highlights that one of the main methodologies for quantifying payments for environmental services is the willingness to pay for it. There are costs that someone (society) has to pay. That means the income of those who demand environmental services is one of the main restrictions on the implementation of PES. "The payments for environmental services can be associated with other products as well". In this case, the willingness to pay varies a lot depending on the people and there is, in fact, the issue of income. The researcher points out that the higher the income, the more people tend to be concerned with the environmental issue. "You don't pay for the environmental service [necessarily] in isolation, you pay for it embedded in your lipstick, in your notebook, or in any other service you buy. This is accounted for, but in a luxury good, let's say. In Brazil, this is a real restriction – which totally distinguishes our reality here from that of high-income countries, especially of Europe, that is more sensitive to the topic", Antoniazzi points out.

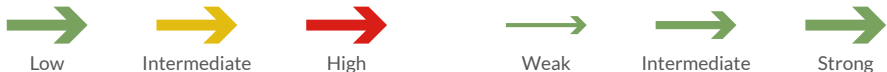


Figure 1 - Ecosystems services and the connections with well-being



Arrow color: potential for mediation by socioeconomic factors

Arrow width: strength of the connection between ecosystem services and human well-being



Source: MEA (2005).

ENVIRONMENTAL OR ECOSYSTEM SERVICES?

When discussing PES, it is necessary to be careful not to confuse environmental services with ecosystem services. Although similar, and widely used synonymously, the two types of services have a difference. The term “eco-

system services” was primarily introduced in the 1980s, but the origin of the most current concept dates back to the late 1960s and 1970s. At that time, the social value of diverse functions of nature stood out⁴. In other words, ecosystem functions can be understood as the capacity of natural processes to provide goods and services that directly or indirectly satisfy human needs⁵. Ecosystem services (e.g., waste assimilation) as well as ecosystem products (e.g., food) that represent benefits to the human population derive directly or indirectly from ecosystem functions⁶ (Figure 2). Or, as the PNPSA states, ecosystem services are the relevant benefits to society generated by ecosystems, in terms of maintenance, restoration or improvement of environmental conditions. This is the case, for example, of a riparian forest that works to maintain the water supply of a certain community, or the role of a biodiverse fauna in pollination or protection from pests and diseases in crops⁷.

The main difference between environmental services and ecosystem services is that, in the first case, the benefits generated are associated with management actions by individuals in natural systems or agri-ecosystems; on the other hand, ecosystem services only reflect the direct and indirect benefits provided by the functioning of ecosystems, without human interference. With this, PES can appear as an economic incentive to encourage agents, whether rural producers or not, to adopt sustainable development and preservation practices.

PES provides a range of opportunities for social and economic actors – it is the institutional space for interaction. Macedo reflects on this: “It is a point towards which several of our goals will converge. It is a positive agenda that will promote this convergence of the private sector with the third sector. PES has the power to bring investments to Brazil and attract investors”. Antoniazzi, with a similar view, claims that the PES concept is an “umbrella” that encompasses different ideas.

In fact, PES “is a broad concept, as you pay for an environmental service that is not on the market. Externally, you quantify this and set the price to function

4. Hermann *et al.* (2011).

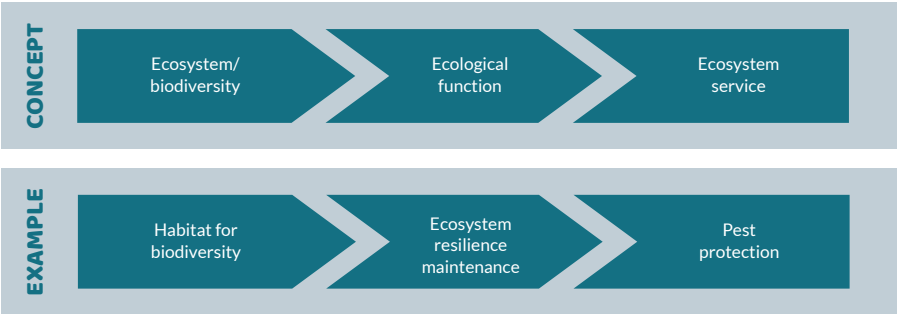
5. De Groot, Wilson and Boumans (2002).

6. Constanza *et al.* (1997).

7. Tôsto, Pereira and Mangabeira (2012).

as a market, which can be done in various ways”, explains the researcher, giving the carbon credit market as an example. “There are several environmental services, some easier to understand and others that are a little more complex to understand as a service, like a product, a unit that will be quantified”, Antoniazzi points out.

Figure 2 – Ecosystems functions and related services



Source: Seehusen and Prem (2011).

The environmental service is provided by an economic agent by ensuring conditions for an ecosystem service to exist, generating specific gains for one or more individuals. In this sense, Antoniazzi emphasizes the importance of using adequate metrics when calculating payment for these services. “You have to quantify the environmental benefit, and that is a challenge in the environmental economics part, because there are several methodologies and techniques. Depending on how you do it, the result can be completely different, and this has everything to do with who is using this environmental service”, the researcher observes. She also reiterates that ecosystem services markets should contribute to local development rather than hindering it. In this way, it is recognized that providers and demanders of these services have different visions and strategies. Environmental decision-making relies on several stakeholders.

PES AND SOCIAL INCLUSION

“The importance of biodiversity is undeniable. Biodiversity has value and we have to preserve it.”

Laura Antoniazzi

Payments for environmental services create a specific market and provide remuneration and other rewards for those who protect nature. Public policies must include tools for the equitable distribution of these dividends. This requires the inclusion of low-income families and vulnerable groups in the project design and management decisions. This inclusion can only happen via a mediating organization that has, above all, the trust of the particular community involved.

In Antoniazzi's assessment, the two models of small (traditional) production and large production are complementary and could develop together. Placing them as antagonists is a distorted view. “I think there is everything for large companies, whether traders or the farms themselves, to be able to finance these new businesses. The issue is much more the integration of these two formats, or modes of development and production, than the choice”, the researcher evaluates.

She reinforces that these are different markets, with different sizes and economic potentials. “We cannot compare different things. I am enthusiastic about the better use of biodiversity, of native species with fruits, nuts and everything else, which add greater value. This market is only smaller. It is not about choosing one or the other, but how to live with things. Because the extent of the area devoted to soy and agribusiness, both in terms of territorial extension and market share, is one. The size of these other social and biological products is another”, Antoniazzi concludes.

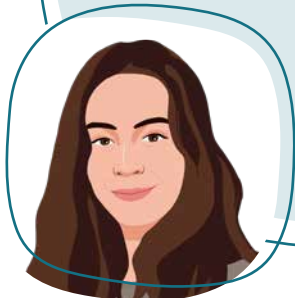
Regarding the expansion of soy in the Cerrado, Antoniazzi explains that the amplification of agricultural frontiers in the MATOPIBA region, despite gen-

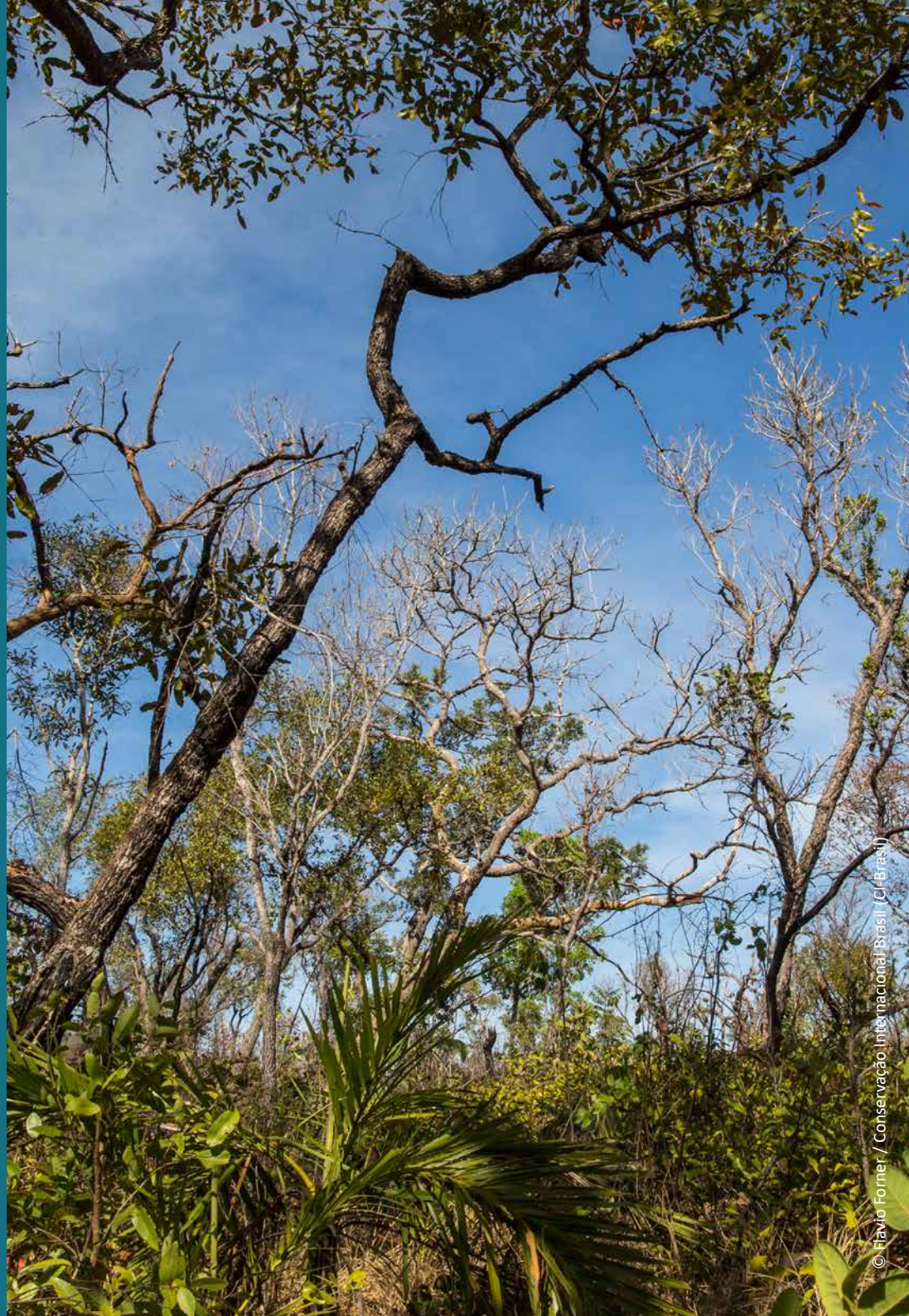
erating social problems, has created “pockets of development”. “There are invasions, conflicts at the border and other serious illegalities that must be fought. But I’m trying to say that, as a whole, there is a very important development and this process has to be understood and directed”, the researcher evaluates. She defends the adoption of mechanisms that allow this development to be used and distributed as much as possible. “From a fiscal point of view, local states can use funds collected there to support communities in the region”, Antoniazzi points out.

Legal certainty is essential

For the full development of PES, there must be clear rules and legal certainty, a fundamental issue for attracting investments. “That’s why we have put so much effort in a national policy, because certainly one of the pillars for this harmonious relationship to happen is to have clear rules and legal certainty for this process as a whole”, Macedo says. It is possible to have harmony between production and preservation, among different sectors and different groups. However, for this, we must “build the rules of the game in a participatory way that brings legal certainty as well”, she reflects.

She considers as fundamental that public policies, in their construction, are based on the pillars of governance and transparency.





THE CASE OF MATOPIBA AND THE CERRADO

Since the valuation of environmental services relies directly on the willingness of agents (people and organizations) to make the payment, in the case of the Cerrado this challenge is even greater. This is because society lacks knowledge about the importance of this biome, and also because of the characteristics of the Cerrado when compared to the Amazon or the Atlantic Forest. Maintaining the Cerrado is fundamental to supply the basins that later go to other regions of the country.

A typical example of deforestation pressure on the biome is the expansion of the agricultural frontier in MATOPIBA. The increase of soybean cultivation generates economic gains for these regions. But from an environmental point of view, this expansion has been a challenge because of the opening of new areas. In this context, PES might be a solution as it can foster the expansion of soy in the region through increased productivity and added value – and not on areas of native vegetation.

A survey carried out with 39 landowners from Tocantins and 14 from Bahia (totaling an area of 90,000 hectares) indicated that the efficient level of PES in the region would be R\$ 664 per preserved hectare per year - considering a 10% surplus of native vegetation in addition to the Legal Reserve provided for in the Forest Code. The measure would be enough to generate environmental benefits estimated at R\$1,027 per hectare per year, and engagement of up to 31% of the owners⁸.

“Many properties have preserved native vegetation in them. Instead of funding deforestation when we buy soy, we could fund conserved forests. So, we could have a mechanism of payment for environmental services embedded in the Brazilian soy”, Antoniazzi concludes.

PES expanded the debate on sustainable production through the incorporation of value in the adoption of agricultural practices that mitigate damage and restore ecosystems. “I have seen that there is interest from the private

8. Gasparinetti *et al.* (2020).

sector in different industries, from pulp and paper to meat. In other sectors, which make use of the land in some way, such as cosmetics and mining, everyone is looking at how value can be placed in their forest protection areas”, Macedo says.

Female presence helps to preserve native vegetation

The expectation is that ecosystem services markets will contribute to local development rather than impede it. Projects for the development of these markets need to recognize the different views and strategies of providers and demanders, as well as the existence of various stakeholders. Markets are functional instruments on issues such as fairness and equitable distribution of results. Legitimate decision-making requires that families and women with few resources are involved in the project design and management decisions, as well as ensuring that the mediating organization (involved in the establishment and structure of the market) has the trust of the members of the community. Results that are more equitable are likely to be achieved when there is communal ownership of forest lands. That tends to exist in traditional communities (theme covered in brochure 8), or when economic power is distributed equally within the community before market creation.⁹¹

Among the municipalities of the Good Growth Partnership, there is a greater prevalence of female leaders on small properties and family farms. When compared to large monocultures of soy, the smaller farms have predominantly sustainable activities linked to socio-biodiversity. Laura Antoniazzi concludes that the small(er) presence of women in MATOPIBA's agricultural frontier is related to the way these regions were occupied. "I have this perception that the women

9. Corbera, Brown and Adger (2007).

who end up taking over the family business are not necessarily the ones who were pioneers, who went there and opened up areas. They inherited because they are daughters, for example. In agricultural frontier regions, it is normal to have fewer women”, the agronomist points out.

According to the experts, women tend to be more sensitive to the issue of sustainability and, therefore, more likely to adhere to programs that promote modern production practices. The topic of gender needs to be present in discussions about the sustainability of agriculture in the Cerrado, just as the environmental and social aspects of production are increasingly present. “I think the gender discussion is being left out of the question. As if it were totally alien to the environmental issue”, Antoniazzi concludes.



THE TRAJECTORY OF OUR EXPERT TOWARDS THE ENACTMENT OF THE PES LAW

“PES has become a light at the end of the tunnel for the preservation of biodiversity.”

Fernanda Macedo

After years of discussion in the National Congress and a rare agreement between environmental sectors and agribusiness, the Law No. 14.119 of January 13th, 2021, instituted the National Policy on Payments for Environmental Services (PNPSA). This law created the legal basis for Indigenous peoples, traditional populations, rural producers and other sectors of society to have their environmental protection efforts protected and valued. The enactment of the new law was a battle that Fernanda Macedo was involved in, from debate to negotiations. Macedo points out that the PES Law represents a great opportunity for society as a whole and she is proud of the work that the coalition has done throughout all these years until the enactment of the law.

Macedo shares how this intense process of drafting the law and getting the involvement of social and political actors unfolded. “Considering that PES is a great opportunity for us, we have done all the dialogue with the Brazilian Congress in recent years, trying to bring parliamentarians closer to the environmental and agricultural groups, and contributing to the construction of an agreement among them. This agreement was responsible for advancing the agenda, even during a pandemic, up to the stage of presidential sanction, and more recently, the overthrow of presidential vetoes,” she says. Macedo makes an important reflection on the next steps after the enactment of the PNPSA Law: “Politics is a first step. Now, we have the challenge of PES regulation in Brazil. At the moment, we are happy because we finally have this policy and we managed to overturn the vetoes that threatened its implementation”.

CHALLENGES FOR PES

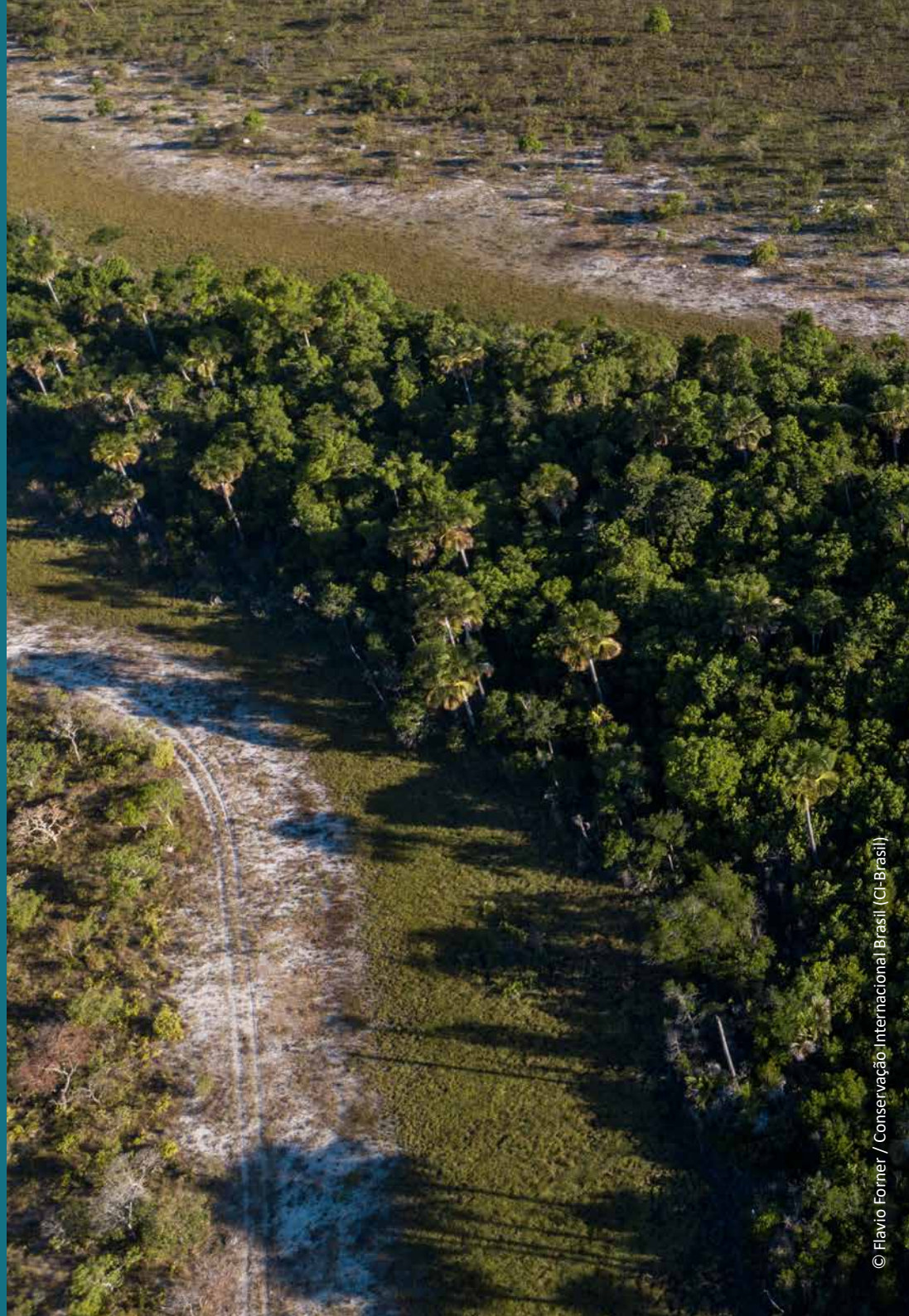
Although considered a key to containing the advance of deforestation and a strategy to encourage the conservation of natural resources, PES offers a number of other environmental benefits. However, the PNPSA still faces considerable challenges for its implementation in Brazil. In addition to the difficulties inherent to the pricing of PES and the country’s socioeconomic inequalities – which limit the willingness of society to pay for the benefits generated by PES – there are political and legal aspects that need attention.

Several economic players discuss the potential sources of funds for PES. The payments need to generate socio-economic and environmental benefits, especially for Indigenous peoples, traditional communities and family farmers. This public has a key role in the conservation of natural resources, but it is also one of the most vulnerable groups to the effects of climate change. These effects are greatly caused by the loss and degradation of forests and, in turn, disrupt ecosystem services. Resources from payments for environmental services could be associated with fair and inclusive strategies to strengthen socio-biodiversity chains.

Environmental services are also influenced by cultural and social aspects that shape gender roles, which in turn influence institutions and the governance of natural resources, markets and labor relations. Men and women often use, experience and benefit from ecosystem services in different ways, and may have different knowledge and predisposition to change – consequently, quality and ecosystem services will have different outcomes for men and women. Not taking into account social aspects, such as gender, means that the most vulnerable will not benefit from development interventions^{10, 8}

The participation of women within this new economic logic makes PES more inclusive and sensitive to social issues. Women would be acting again as protagonists and multipliers of public policies. Fernanda Macedo reflects that, after PES is regulated, “there will be challenges to measure the results and update the public policy from time to time. This is the challenge of social participation; If the law is being implemented with the voice and presence of the various social groups”.

10. Fortnam *et al.* (2019).



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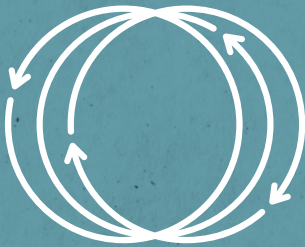
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