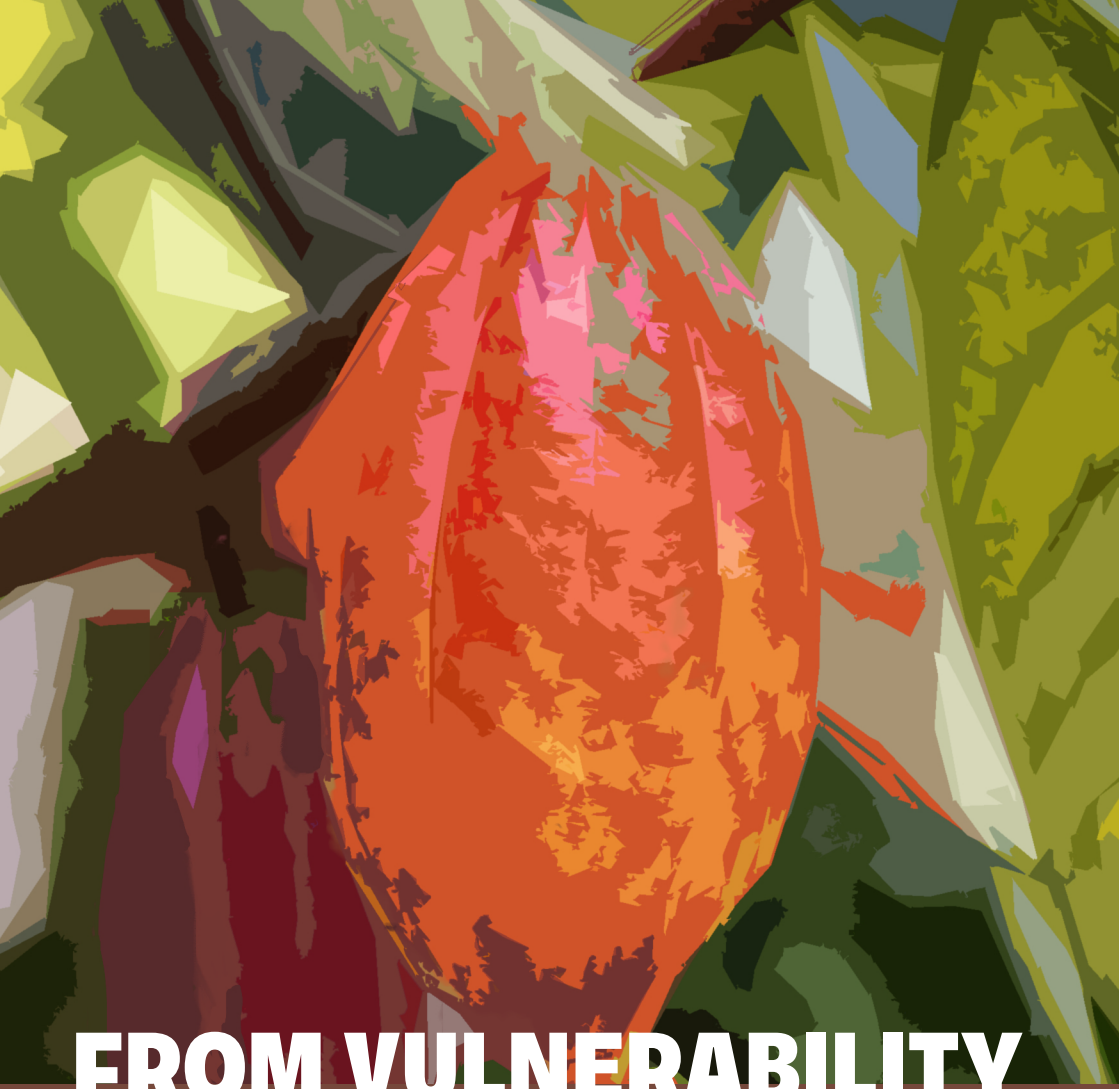

FROM VULNERABILITY TO RESILIENCE

Climate Change Adaptation in Brazil's Cacao Value Chain

Project Partners:

cscp SEBRAE

Funding:

Global Gateway AL-INVEST Verde UNIÓN EUROPEA

PROJECT CONSORTIUM

Lead Partner: Serviço de Apoio às Micro e Pequenas Empresas do Estado de Rondônia (SEBRAE RO), Brazil

Partner: Collaborating Centre on Sustainable Consumption and Production (CSCP), Germany

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Project Partners:

Funding:

FOREWORD

In the face of a changing climate, this booklet aims to empower cocoa farmers with knowledge and tools to build a more resilient future. Our goal is to share practical strategies that improve cocoa production, maintain productivity, and protect livelihoods. By adopting these adaptation practices, cocoa farmers can make their farms more climate-resilient and ensure the long-term sustainability of cocoa production.

TARGET AUDIENCE

Small and medium-sized cocoa farmers, especially family farmers located in Rondônia, in the Amazon biome.

KEY RECOMMENDATIONS

Strengthening resilience in cocoa production requires a combination of actions at the farm level and supportive policies. Key recommendations include:

- **Invest in climate-smart practices:** Encourage diversified and shaded cocoa systems, soil and water conservation, and agroforestry to stabilize microclimates and increase resilience.
- **Prioritise data-driven decisions:** Monitor yields and revenues, disease trends, and climate indicators to inform proactive farm management.
- **Focus on quality and market differentiation:** Emphasize high-quality genetics, proper post-harvest processing, and sustainable practices to access specialty markets.
- **Strengthen knowledge networks:** Farmer cooperatives, extension services and digital tools are critical for sharing best practices, strengthening disease prevention and developing adaptive innovations.
- **Promote policy support and governance:** Implement legal frameworks, monitoring, and incentives to prevent deforestation, encourage climate-smart agriculture and facilitate investment in adaptation strategies.

To secure the long-term resilience and competitiveness of Brazil's cocoa sector, these measures should be scaled across high-potential regions such as Rondônia. Farmer training programs, research into drought-tolerant and high-quality cocoa varieties, and regional collaboration for knowledge-sharing and climate monitoring will further strengthen the sector. Policies that reduce deforestation and support low-emission agriculture are critical to ensuring environmental sustainability alongside economic growth.

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INTRODUCTION

Climate change is already a threatening reality for cocoa production across Brazil's (sub)tropical regions today, leading to vulnerability caused by the dual challenge of increasing climate pressure and scarce means to cope with them. Rising temperatures, irregular rainfall, longer dry seasons and more frequent extreme weather events are altering the conditions necessary for the healthy growth of cocoa trees. These changes increase the risks of pests and diseases, reduce yields and threaten the main source of income for thousands of smallholder farmers, who often have limited resources to adapt.

Theobroma cacao is a native species of the Amazon biome that depends on a warm and humid climate. When rainfall patterns shift or temperatures rise too much, the trees can suffer, and so can the quality of the beans. Due to this sensitivity, the cocoa sector is among those most vulnerable to climate change. Adapting the way we farm, for example through better soil management, shade systems and crop diversification, is essential to secure production for the future.

Brazil is the second largest cocoa producer in South America and one of the top producers in the world. Cocoa is grown on around 600,000 hectares, mainly in the states of Pará and Bahia, which together produce almost all of Brazil's cocoa (approximately 96%). Smaller but growing areas include Rondônia, Amazonas, and Espírito Santo. The Brazilian Amazon biome (including Pará, Rondônia and Amazonas) is one of the most important cocoa-growing regions in Brazil and is considered the birthplace of cocoa. This biome alone accounts for about half of the country's cocoa production. According to estimates from the latest Agricultural Census, climate change could have a direct impact on the incomes of more than 20,500 families in this area, due to its effects on cocoa yields and farmers' livelihoods.

As stated by the Intergovernmental Panel on Climate Change (IPCC 2022), climate adaptation means adjusting our practices

to reduce harm or take advantage of new climate conditions. For cocoa farmers, this means learning new ways to protect their crops and communities, from using shade trees and organic matter to conserving water and restoring degraded areas. Building climate resilience in cocoa production is not only about protecting trees, it is about protecting families, traditions, and the future of cocoa in Brazil. By understanding the changes taking place around us and adopting adaptation practices, farmers can ensure that cocoa continues to thrive for generations to come.

INTERESTING FACTS

The main cocoa-producing regions in Brazil are the states of Pará and Bahia, which together account for approximately 96% of the country's cocoa production

About 90% of the cocoa producing properties are mainly family farming

Cocoa production is predominantly destined to the chocolate industry. The main derivatives of cocoa production are **chocolate, chocolate powder and cocoa butter.**

BIOGEOGRAPHICAL DATA

Cocoa grows best in regions with:

temperatures above 21°C

rainfall ranging between 1400 and 2000 mm/year

hot and humid climates (with a latitudinal range of 20°N to 20°S)

Source: https://www.researchgate.net/figure/Map-of-Brazilian-biomes-with-states-and-regions-Adapted-from-IBGE-2008_fig1_227691335

CURRENT SITUATION

In 2023/2024, cocoa prices reached record levels due to a global supply shortage influenced by extreme weather and climate factors in major producing regions worldwide, especially in West Africa. This surge highlighted Brazil's potential as a reliable cocoa supplier amid global market instability.

Cocoa has deep roots in Brazil's history and a growing role in its future. Across the Amazon, thousands of smallholder families cultivate cocoa as a **vital source of income** and a sustainable alternative to more land-degrading practices. Today, Brazil stands among the world's leading cocoa producers, combining a proud agricultural tradition with a remarkable capacity for innovation.

The state of Pará, in the Amazon biome, leads national production, but Rondônia is emerging fast, with fertile soils, strong agricultural experience, and land suitable for reforestation. Brazilian agriculture is known for its leadership in innovation and **adaptability**: farmers are embracing crop diversification, regenerative practices, and small-scale mechanisation, all of which are vital for climate-resilient cocoa.

When cultivated in **agroforestry systems** (**AFS**), cocoa becomes part of the climate solution. Shade trees stabilise microclimates, protect soils and improve water retention, while boosting biodiversity and carbon storage. **Traditional "cabruca" systems** in Bahia show how cocoa can coexist with native forest, storing up to 2.5 times more carbon than monocultures. Pedro Ronca, director of CocoaAction Brasil, states that "in fact, cocoa is a driver of reforestation when it is planted in agroforestry systems to recover pasture lands." In **Rondônia**, farmers are already combining cocoa with shade trees, fruits, and timber species, building **resilient and diversified farms** that sustain both people and forests.

HOW WILL CLIMATE CHANGE IMPACT COCOA PRODUCTION?

Cocoa thrives in humid, shaded environments, yet it is highly sensitive to heat and water stress. Climate studies indicate that cocoa production in Brazil is highly vulnerable to climate change. Although Rondônia is less affected than other regions in Brazil, the graphic below still shows steadily increasing temperatures.

What studies say:

- Igawa et al. (2021) project that under a moderate scenario **(RCP 4.5)*** around 60% of analysed cocoa-producing municipalities in Brazil may be affected by climate change; under RCP 8.5, up to 95% could be impacted.
- Igawa et al. (2022) identify rising temperatures and declining rainfall in key cocoa zones. Since cocoa requires > 1,400 mm rainfall per year, reduced precipitation quickly leads to soil-water deficits and lower yields.
- In the Amazon biome, warmer and drier conditions could reduce suitable areas in southeastern Pará, potentially cutting national output by 4.2% and affecting 8,800 farming families (Igawa et al. 2022).

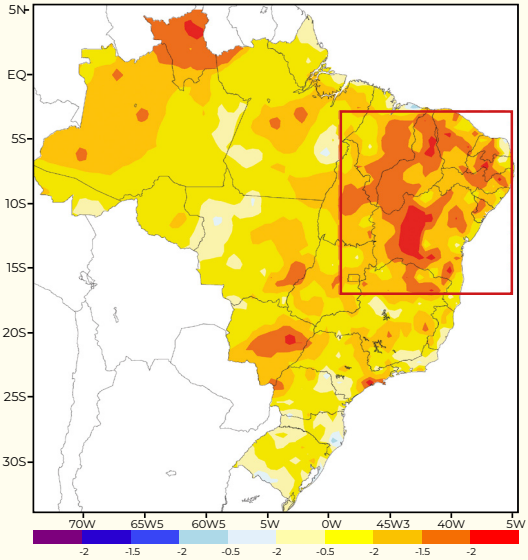
* DID YOU KNOW?

RCP, in the climate context, stands for **Representative Concentration Pathways.**

These are greenhouse gas (GHG) emission scenarios used to simulate the future of the climate. These scenarios consider different projections of economic growth, population growth, and technological changes to predict how GHG concentrations will evolve over time.

- Despite these challenges, Rondônia shows large areas suitable for cocoa expansion under both RCP4.5 and RCP8.5 scenarios. This presents an important opportunity for the state to develop resilient cocoa production systems, complementing existing production in Pará and contributing to the stability of national supply (Igawa et al. 2022).

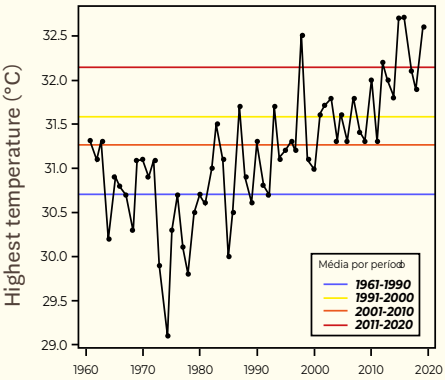
Maximum temperature anomaly 2011–2020



Average high temperature

Temperatures are rising across the country, reaching 3°C in some areas, particularly in the Northeast and in the states of Roraima and Mato Grosso do Sul

Annual average high temperature



Source: Ministry of Science, Technology and Innovation (MCTI), Brazil. (2024). First Biennial Transparency Report of Brazil to the United Nations Framework Convention on Climate Change (BTR1). Brasília: MCTI. Retirado de: https://www.gov.br/mcti/.../BRA_BTR1_2024_ENG.pdf Tea & Coffee Trade Journal+5

KEY CHALLENGES AND OPPORTUNITIES

While Brazil's cocoa sector shows great potential, climate change poses real challenges that could impact production, farmers' livelihoods, and the entire value chain. **Adapting to these changes is no longer optional** as without action, cocoa farmers become more vulnerable, the global cocoa supply is at risk, and economies and businesses across the chain can be harmed. At the same time, these challenges open the door to **new opportunities for adaptation and more sustainable, resilient production.** The following sections highlight the main risks and practical strategies to address them.

RISING TEMPERATURES AND WATER SCARCITY

Longer dry periods reduce flowering and fruit development, affecting productivity and farmer income. Cocoa trees need abundant water and moderate temperatures to thrive. Under future scenarios:

- Higher temperatures and reduced rainfall will cause stress on cocoa plantations
- Young plants are particularly vulnerable, and prolonged droughts can significantly reduce growth and yields
- Water deficits in the soil directly affect both tree health and productivity

Opportunities: Implementing shade trees or applying soil mulch, as well as irrigation and water retention techniques, can help cocoa cope with hotter and drier conditions.

INCREASING RISK OF DISEASE

The witch's broom fungus (*Moniliophthora perniciosa*), which devastated Bahia in the late 1980s and left 150,000 farmers unemployed, is still a threat to cocoa production and may become even more intense in the face of climate stress.

Opportunities: Implementing proactive pest and disease management, including resistant varieties, as well as good hygiene practices and early detection, can reduce the risk of disease and protect incomes.

DEFORESTATION AND COMPETITION FOR LAND USE

Although cocoa can contribute to reforestation, its expansion sometimes overlaps with other drivers of deforestation, such as pasture, soy, oil palm, coffee, mining, and timber extraction. In Brazil, around 35% of cocoa volumes are linked to deforestation caused by agricultural expansion.

Opportunities: Expand cocoa production in a sustainable manner and without deforestation of native forests, integrating agroforestry systems instead of implementing monoculture. Use native species that contribute to forest diversity. It is worth noting that political support is crucial to combat illegal deforestation through monitoring, licensing, and enforcement.

THE ADAPTATION DILEMMA

Smallholders face difficult economic choices between investing early in adaptation measures (shade, irrigation, resilient varieties), which incur short-term costs, and risking greater losses in the future. Delaying adaptation increases vulnerability to future droughts, heat stress, and production losses. Limited credit and insufficient technical support often delay action.

Opportunities: Seek support from cooperatives, buyers or government programmes, as they have the capacity to make adaptation feasible and economical.

Strong environmental governance, through reducing illegal deforestation, improving land-use monitoring and restoring degraded land, is essential for the long-term resilience of cocoa production. Therefore, aligning production with conservation through incentives for agroforestry, carbon sequestration and traceable supply chains can position Rondônia as a leader in climate-smart cocoa.

CORE CONCEPTS AND KEY PRINCIPLES

Understanding how climate change affects cocoa production requires starting with a few fundamental concepts. These ideas help explain why cocoa is vulnerable, what makes some systems more resilient, and how adaptation can turn risks into opportunities.

What is climate change and why does it matter for cocoa?

According to the United Nations Framework Convention on Climate Change (UNFCCC 1992), Article 1, climate change is defined as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."

In practical terms, this means the global climate is warming, rainfall patterns are shifting and extreme weather events are becoming more frequent. For cocoa, a crop that only thrives under stable temperature and rainfall conditions, these changes

Climate vulnerability tells us where the risks lie. Resilience shows us how to overcome them. Adaptation is the bridge between the two, and climate action the shared commitment — ensuring a future for cocoa, communities and nature.

are deeply concerning, meaning that its climate vulnerability is considered to be particularly high.

Scientific projections show that forest biomes across South America, including major cocoa-producing regions, will become warmer and drier by the end of the century. Higher temperatures increase the plant's evapotranspiration rate, creating greater water stress and affecting cocoa's physiological processes. As cocoa trees require more than 1,400 mm of rainfall per year, even small reductions in rainfall or longer dry seasons can impair flowering, reduce yields and put young plants at risk.

Why is cocoa so vulnerable?

The Intergovernmental Panel on Climate Change (IPCC, 2001) defines climate vulnerability as the degree to which a system is susceptible to or unable to cope with the adverse effects of climate change. Two interrelated dimensions determine this vulnerability:

- **Ecological vulnerability:** how severely crops and ecosystems are affected by magnitude, rate, and nature of impacts, i.e. changes such as temperature increases or water scarcity.
- **Social vulnerability:** the ability of people and institutions, especially smallholder farmers, to anticipate, respond to and recover from these changes, shaped by political, cultural and economic factors.

In many cocoa-producing regions, these vulnerabilities overlap. Limited financial capacity, lack of technical support and exposure to extreme climatic events make it increasingly difficult for farmers to adapt.

How can climate adaptation reduce risks?

Climate adaptation, according to the IPCC (2022), is "the process of adjusting actions in anticipation of or in response to climate stimuli to mitigate harm or exploit opportunities."

In the cocoa context, adaptation can mean applying practical measures, such as

- planting shade trees
- managing water and soil more efficiently
- developing heat- and drought-tolerant varieties
- diversifying crops to mitigate risk

Adaptation is not just about protecting yields, but also about securing livelihoods and maintaining the stability of entire value chains. Without adaptation, climate change could significantly increase the vulnerability of farmers and undermine the global cocoa supply.

What does climate action mean in this context?

Climate action refers to collective efforts to combat climate change and its impacts through both **mitigation** (reducing greenhouse gas emissions) **and adaptation** (preparing for unavoidable impacts).

At the global level, the European Union's climate strategy aims to reduce emissions by 55% by 2030 and achieve climate neutrality by 2050. For cocoa-producing countries like Brazil, which aim to export to the European market, this highlights the need to align production with sustainable land-use practices, curb deforestation, and invest in low-emission, climate-smart farming systems. In the political arena, the EUDR, for example, is one of the EU's measures to reduce deforestation in importing countries such as Brazil.

What does developing resilience mean?

Ultimately, both climate adaptation and climate action aim to strengthen resilience: “the ability not only to withstand and cope with challenges but also to adapt and transform in a sustainable, fair, and democratic way” (EC, 2020).

In cocoa systems, resilience means creating farming landscapes that can absorb shocks and recover quickly. This can be achieved through:

- **Agroforestry and diversification**, which moderate temperature extremes and conserve moisture.
- **Soil and water management,** improving fertility and retention to withstand droughts.
- **Innovation and knowledge-sharing,** empowering farmers to anticipate change and adopt new practices.

Developing resilience means transforming vulnerability into strength, ensuring that cocoa production remains viable while supporting the ecosystems and communities that depend on them.

DO YOU KNOW ABOUT THE EUDR?

The EUDR (European Union Deforestation-Free Products Regulation) aims to prevent commodities associated with deforestation from entering the EU, while also promoting climate action in countries that produce cocoa, coffee, soybeans, and other commodities. To learn more about the regulation and its benefits, read our booklet on “Transparent and deforestation-free value chains.”

#PRACTICAL GUIDE FOR PRODUCERS

For smallholder cocoa farmers, adapting to climate change is not just an option, it is a survival strategy. Rising temperatures, changes in rainfall and the emergence of pests require smarter and more resilient forms of agriculture. Climate adaptation helps safeguard yields, protect livelihoods, as well as opening doors to new market opportunities.

STEP 1: EMBRACE CLIMATE-SMART PRACTICES

Adaptation begins with the land. Combine traditional knowledge with modern techniques to create more resilient cocoa systems.

- **Protect biodiversity** by maintaining mixed cropping systems and native species that sustain ecosystem balance
- **Diversify and shade:** Integrate shade trees to reduce heat stress and conserve soil moisture.
- **Conserve water:** Use mulching, contour planting, and small--scale irrigation to cope with dry periods.
- **Enrich soils:** Apply organic matter and maintain ground cover to retain nutrients and prevent erosion.

Strong roots build resilient farms.

STEP 2: USE DATA TO GUIDE DECISIONS

Information is power. Data-driven strategies help farmers to demonstrate transparency in their production, anticipate risks and make informed choices.

- **Track income and yields** to identify the most profitable and sustainable practices.
- **Monitor weather and disease** trends using mobile tools or local networks.
- **Protect biodiversity** by maintaining mixed cropping systems and native species that support ecosystem balance.
- **Implement a traceability system** in your production that helps prove the sustainability of the value chain to buyers.

Smart farming is not about high technology, but about using the right information at the right time.

STEP 3: FOCUS ON QUALITY AND DIFFERENTIATION

Climate adaptation can go hand in hand with market innovation.

- **Choose high-quality genetics** that are suited to local conditions and resistant to disease.
- **Prioritise good post-harvest practices,** especially fermen-

tation and drying, to improve the flavour and shelf life of the product.

- **Explore specialty cacao markets:** single-origin cocoa, fine flavour, and sustainable production can command higher prices and reward good farming practices.

Adapting to climate change can mean earning more through quality, sustainability and resilience.

TOOLS & RESOURCES

Farmer field schools and agricultural cooperatives: learn from peers and share data for collective improvement.

Digital platforms: use weather apps, income trackers, or disease monitoring tools for better decision-making.

Local research and extension services: gain access to improved planting materials, training, and early-warning systems

SUCCESS STORY: DOIS RIACHÕES SETTLEMENT

Context: After the fungal disease known as “witches’ broom” devastated cocoa crops in the 1990s, the land was abandoned. In 2008, around 40 smallholder families reoccupied degraded land in Dois Riachões Settlement (Bahia, Atlantic Forest) following social movements. The land was granted to them by INCRA, Brazil’s National Institute of Colonisation and Agrarian Reform, and now smallholders sell high-quality cacao to major chocolate brands.

Practices:

- In the Dois Riachões settlement (municipality of Ibirapitanga), the outbreak paved the way for land reform. Around 150 inhabitants mobilised for their land rights and received training and support from institutions, eventually becoming an example of how to overcome adversity.
- Restoration of cocoa under the cabruca system (agroforestry with native forest shade), an agroecological system that had been practiced in the region for 170 years, in which farmers plant cacao trees and other crops without clearing native forest.
- Preservation of the traditional parazinho cacao variety (no hybrid or clones) providing much tastier chocolate.
- Collective work and sales through cooperatives.

Outcomes:

- Currently, the 406-hectare settlement does not have a single owner, as it is collectively managed by all 150 members of the community.

- Collective participation is key, and each stage of cultivation is carried out jointly by the farmers, who sing while breaking the cocoa. Mara Silva, a member of the community, shares: “We can’t handle 4 hectares [10 acres] by ourselves, but we can do it by working with the neighbours”.
- The community started selling premium cacao to major brands and achieved freedom, financial independence and food sovereignty.
- Farmers’ incomes have more than doubled since 2008, and the community’s income per hectare is four times higher than obtained with a conventional system.
- Food sovereignty and biodiversity improved through diversified crops and cocoa.
- Promotion of education and sovereignty: a community education commission was created to provide quality education and access to all levels of training. The commission built a nursery and is completing work on a National School of Agroecology.

Lesson: Smallholders can rebuild resilient livelihoods after crises by combining traditional shade systems with cooperative actions.

To learn more about this success story, scan the QR Code or watch the video here.

Foto de Patrícia Moll.

BARRIERS AND ENABLERS

What hinders climate adaptation in Brazil?

In many cocoa-growing regions, the path to climate adaptation is far from straightforward. Farmers and organisations often face poverty traps stemming from a cycle created by technological constraints, market inefficiencies and institutional gaps. These conditions limit access to knowledge, resources, and services, restricting the ability to adopt new practices that could increase resilience to climate change.

When resources are scarce, it is common that decision-makers may respond in ways that provide short-term relief but fail to reduce long-term risk. This phenomenon, known as maladaptation, occurs when adaptations unintentionally worsen the vulnerability or ecological damage of the area being treated. For example, relying on risky water sources or expanding into marginal lands may help temporarily, but create lasting problems for the farm and surrounding landscape.

Psychological barriers, i.e. fears, beliefs and resistance that can hinder change, also play an important role. Experiencing the impacts of climate change can trigger stress, fear, and uncertainty, which may lead farmers to prioritise immediate coping strategies over long-term planning. These short-term solutions can unintentionally reinforce "climate traps", vicious cycles that trap communities in vulnerability and reduce their capacity for future adaptation.

What contributes to successful adaptation?

To overcome these challenges, it is necessary to have access to information, share knowledge, and offer targeted support:

- Data and decision-making: Timely and clear data empowers farmers to make informed choices that increase productivity while strengthening income resilience over the long term.
- Research and technology: Investments in disease prevention, improved planting materials, farmer training, and digital tools can provide the knowledge and resources needed to adopt climate-smart practices.

By combining actionable knowledge with practical tools, stakeholders in Brazil's cocoa sector can break cycles of vulnerability, replace maladaptive behaviours with sustainable strategies, and create a more resilient future for farms, farmers, and the entire cocoa value chain.

Knowledge + Tools = Resilience

Shared data, practical training, and innovative strategies empower farmers to adapt and thrive.

INTERACTIVE EXERCISE

QUESTION 1:

What kind of **risks** related to climate change do you experience?

- ☐ Water shortage (Lack of rainfall / water deficit, water scarcity and water stress)
- ☐ Droughts (with maximum temperatures)
- ☐ Severe frost / Cold winters
- ☐ Extreme temperatures (low/high, also changes in humidity)
- ☐ Others:

QUESTION 2

What type of **consequences** of climate change do you experience?

DIRECT EFFECTS

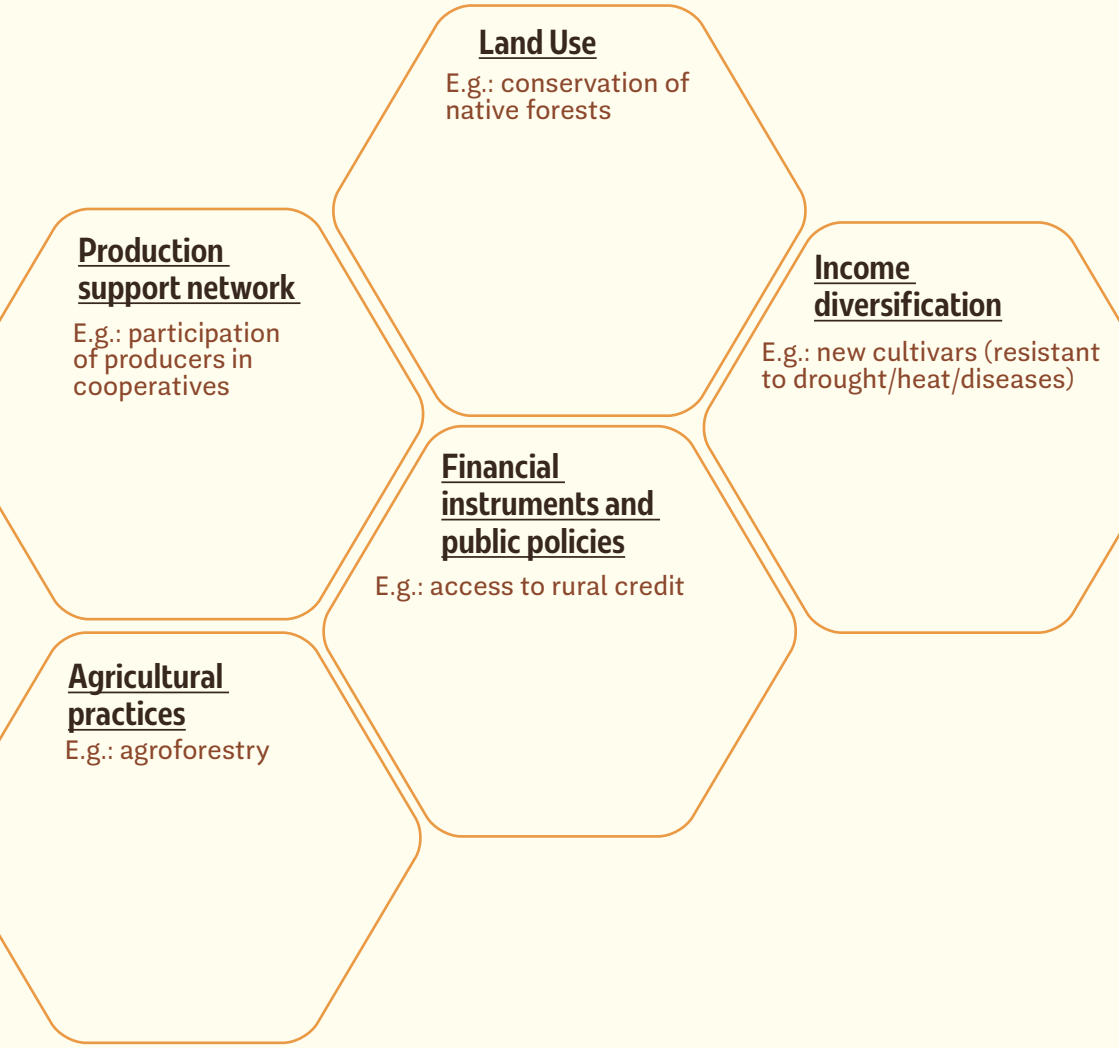
- ☐ Increased financial and planning costs
- ☐ Suitability loss
- ☐ Reduction in producer's income
- ☐ Harvest losses and reduction in production/yields
- ☐ Others:

INDIRECT EFFECTS

- ☐ Increased (geographic) spread of pests and diseases
- ☐ More frequent/severe pest infestation
- ☐ Market volatility
- ☐ Water resource competition
- ☐ Cocoa quality reduction
- ☐ Deforestation and biodiversity loss
- ☐ Others:

QUESTION 3

Given the possible impacts of climate change, how do you think each of the dimensions below can contribute to the future we desire, with a focus on greater climate adaptability?



Need help? You can check some examples on page 36 of this booklet.

ACTION PLAN: TOWARDS A RESILIENT FUTURE IN THE COCOA SECTOR

Description: Based on the exercises you completed earlier, describe your individual action plan here. Consider the risks, consequences and dimensions of adaptation related to climate change for the adaptation measures you intend to implement in the short term (1 year), medium term (2 to 5 years) and long term (more than 5 years).

CLIMATE TRENDS IN RONDÔNIA

- Increased heat waves
- Long periods of drought
- Increased average temperatures
- Increased frequency of heavy and intense rainfall

WHAT TO CONSIDER TO ADAPT

- Agricultural practices
- Financial instruments and public policies
- Income diversification
- Production support network
- Land use

PATHWAYS TO ACTION	
What can be done in the **short term** (1 year)?	What is needed to achieve this?
What can be done in the **medium term** (2–5 years)?	What is needed to achieve this?
What can be done in the **long term** (+5 years)?	What is needed to achieve this?

SUPPORT

TECHNICAL SUPPORT

Serviço Brasileiro de Apoio às Micro e Pequenas Empresas - SEBRAE

SEBRAE supports projects organized and funded by SENAR. These projects provide technical assistance and training on topics such as sustainable soil and water management, agroforestry systems, efficient irrigation, and rainwater harvesting, with the aim of making agricultural production more resilient and sustainable.

To know more: https://sebrae.com.br

Serviço Nacional de Aprendizagem Rural – SENAR

Accompanying a technician during daily activities in the field or on the farm; online or in-person courses and training, such as “Cocoa Cultivation in Sustainable Systems” and “Plant Traceability”.

To know more: https://ead.senar.org.br/ (Cursos-online)

EMATER - Empresa de Assistência Técnica e Extensão Rural

Daily on-site support in the field or on the farm, courses, workshops, field days, and in-person and online training sessions.

To know more: http://www.emater.ro.gov.br/

FINANCIAL SUPPORT

CRA Sustentável (Certificado de Recebíveis do Agronegócio Sustentável)

A financing mechanism that provides credit to small-scale cocoa farmers who adopt sustainable agricultural practices, such as agroforestry systems and low-impact farming methods. The funds can be used for crop renewal, production improvements, and value addition, with technical support and adherence to social and environmental criteria.

To know more**:** https://www.wwf.org.br/?62682/Certificados-de-Recebiveis-do-Agronegocio--CRA-Verde

Banco da Amazônia (BASA)

Credit lines aimed at family farming and sustainable agribusiness in Rondônia, which could benefit cocoa producers.

To know more: https://www.bancoamazonia.com.br/

PRONAF – Programa Nacional de Fortalecimento da Agricultura Familiar

Cocoa producers who qualify as family farmers can access PRONAF, which offers low-interest loans for sustainable practices such as agroforestry, agroecology, and traceability. There are specific programs, such as Pronaf Floresta and Pronaf Agroecologia, that directly support sustainable investments.

To know more: https://www.gov.br/pt-br/servicos/acessar-o-programa-nacional-de-fortalecimento-da-agricultura-familiar-pronaf

CERTIFICATION SCHEMES

Rainforest Alliance

It helps farmers adapt to climate change through sustainable certification, training, and the implementation of resilient practices, combining environmental protection with increased productivity and income. Farmers receive ongoing training on climate adaptation, sustainable management, climate monitoring, and low-impact farming techniques. Certified producers can command better prices for their products, allowing them to reinvest in climate adaptation.

To know more: https://knowledge.rainforest-alliance.org/docs/how-to-get-certified

Fairtrade (Fairtrade (Small-scale Producer Organization - SPO)

It helps smallholder farmers adapt to climate change through training, financing, and organizational strengthening, combining environmental sustainability, resilience, and improved economic conditions.

To know more: *https://www.fairtrade.net/iberica-pt.html*

CONCLUSION AND FUTURE OUTLOOK

Brazil's cocoa sector stands at a crossroads. On one hand, cocoa remains a key source of income for thousands of smallholder families, and the country continues to lead in agricultural innovation, from regenerative practices and agroforestry to small-scale mechanisation. On the other hand, climate change is already reshaping production: higher temperatures, reduced rainfall, and prolonged droughts are putting cocoa, particularly young plants, under increasing stress. Without adaptation, farmers' livelihoods and global cocoa supply chains could face serious disruptions.

Despite these challenges, the situation also presents opportunities. By embracing climate-smart practices, focusing on high--quality cocoa, and strengthening local knowledge networks, farmers can turn vulnerability into resilience. Agroforestry and shaded systems help stabilise microclimates, improve soil and water retention, and enhance biodiversity. Data-driven decision-making, from tracking yields and disease outbreaks to monitoring rainfall patterns, empowers producers to anticipate risks and act proactively. Investing in quality genetics, proper post-harvest processing, and sustainable production allows smallholders to access specialty markets and earn more while producing less, building a competitive advantage that is aligned with climate adaptation.

Looking ahead, Brazil's cocoa regions show both resilience and potential. Rondônia and Pará have historically experienced low to medium cocoa-driven deforestation and are expected to face relatively lower climate risks by 2050, compared to cocoa-producing regions in West Africa. This positions these regions as promising areas for sustainable cocoa expansion. Bahía, however, may encounter higher climate-related pressures, highlighting the need for focused adaptation measures. For

producers in Rondônia and other parts of Brazil, this represents an opportunity to strengthen climate-smart practices, improve productivity, and access global markets for high-quality, sustainable cocoa.

Ultimately, the future of Brazil's cocoa sector depends on proactive adaptation. By integrating climate-smart practices, quality-focused production, and strong networks, farmers can secure their livelihoods, strengthen value chains, and position Brazil as a global leader in sustainable cocoa. Adaptation is not merely a response to risk, it is an opportunity to create resilient farms, thriving communities, and a competitive cocoa industry that is prepared for the future.

Examples of support for the exercise proposed on page 29:

Agricultural practices: Species and cultivars used, relocation of plantations, integrated production system management, pest and disease management practices for mitigation, new technologies such as drip irrigation or water harvesting, agroforestry, soil conservation practices

Financial instruments and public policies: Access to rural credit, insurance against climate risks and crop protection (e.g. ProAgro), emergency funds, public procurement programmes and minimum price guarantees, premiums, etc.

Income diversification: rural entrepreneurship, new cultivars (drought/heat/disease resistant) or crop shift, diversification of cropping patterns or livelihood activities, diversification of marketing channels, access to markets at different levels (local, regional, national)

Production support networks: Producer involvement in cooperatives, associations and bargaining unions, access to technical guidance

Land use: Conservation of native forests (environmental compliance): microclimate and habitat for pollinators, conservation of water resources, infrastructure, landscape management

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