Alliance
Bioversity & CIAT





Systemic innovations and partnerships for equitable, productive & sustainable cacao

For over three decades, the Alliance of Bioversity International and CIAT has worked across the global cacao value chain, from genes to consumption.

The global chocolate industry is valued at over **$150 billion**, with the cacao bean market alone estimated at **$16 billion**. At its heart are around **5 million smallholder cacao farmers** in 50+ countries.

Yet most of these farmers do not earn a **living income**. They face constraints ranging from poor access to improved planting materials to pests, diseases and climate change. Cacao production has also driven significant **deforestation**, risking a spiral of land and biodiversity degradation.

Farmers are often price-takers with limited access to market information and finance, and must meet new food safety and sustainability standards, even as interest grows in differentiated, certified quality markets.

The Alliance's research and systemic solutions along the **cacao value chain**, from its genetic base to the prestigious Cacao of Excellence Awards, benefit farmers, the environment, and purveyors and consumers of chocolate.

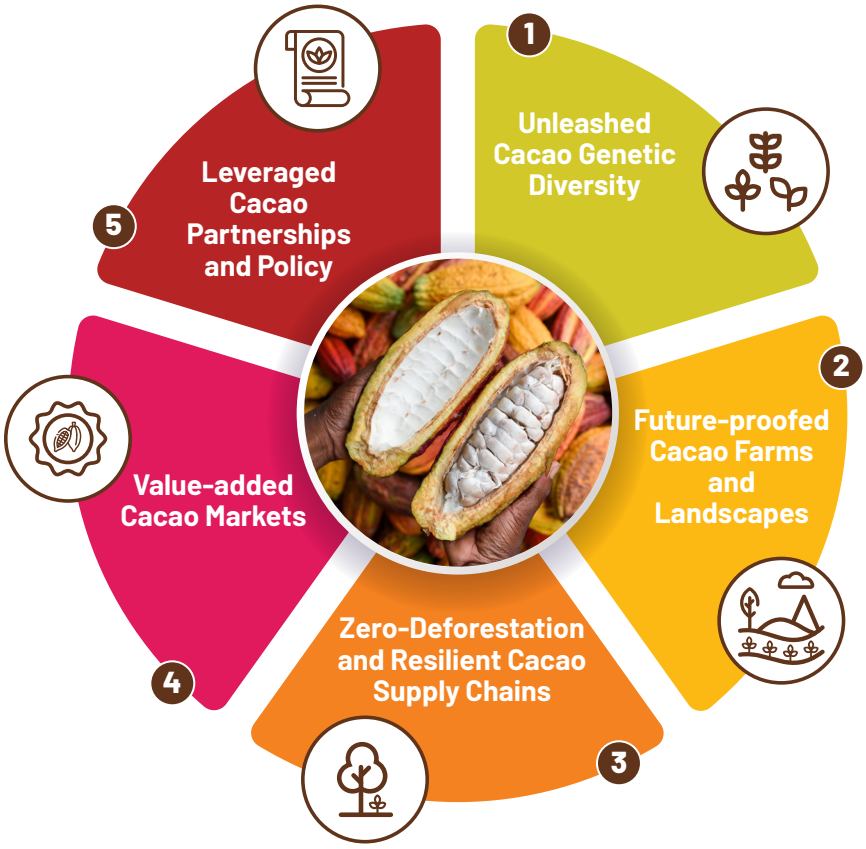


Figure 1. Five Core Priorities

Unleashed Cacao Genetic Diversity

Why?

Cacao genetic resources underpin resilience, productivity and quality, and their diversity in collections, farmers' fields and the wild is key to meeting present and future challenges.

How?

Conservation and use of cacao genetic resources

- Through the Global Cacao Genetic Resources Network (CacaoNet), the Alliance and partners optimize the conservation and use of cacao genetic resources and maintain international guidelines for moving germplasm safely.
- With research partners, cacao authorities and the private sector, we developed a global conservation strategy, including the Global Strategic Cacao Collection (GSCC), a "virtual genebank" of the highest-priority accessions.
- The Alliance developed the Collaborative Framework for Cacao Evaluation to identify and share climate-resilient cacao materials that can be fast-tracked into national breeding programs.

Identification of wild and native cacao diversity

- We have mapped cacao genetic diversity (CacaoDiversity) across major South American producing countries, opening new fine flavor markets.
- We also identified an integrated approach for the conservation of native cacao diversity in Latin America.

Tissue culture and gene editing

- We are using our multi-crop Gene Editing Platform to reduce cacao's absorption of cadmium, a heavy metal in certain soils that can affect cacao quality.

Future-proofed Cacao Farms and Landscapes

Why?

Smallholders face challenges from poor planting material to pests, diseases and land degradation, all exacerbated by climate change. Integrated solutions increase productivity, efficiency and climate resilience.

How?

Agroforestry and restoration

- We assess cacao agroforestry's value for biodiversity and ecosystem services such as pollination, pest control and soil fertility.
- Our management recommendations integrate production and biodiversity conservation in highly fragmented cacao landscapes, such as preserving shade trees and forests that sustain beneficial birds and bats.
- We provide location-specific information to improve the sustainability of cacao farms in South America with the CacaoDiversity tool, which guides agroforestry design and the selection of climate-adaptive propagation material.
- The My Farm Trees platform promotes the planting of native trees, using blockchain to trace the trees from seed to growth, empowering restoration actors and improving livelihoods.

Climate risk and adaptation

- Working with practitioners, we developed lists of locally validated climate-smart practices that have the potential to confront projected climatic change and improve resilience at farm level.
- These practices were matched to site-specific climate risk assessments and are made available through the ACLIMATAR adaptation database, serving World Coffee Research's CafeClima replanting decision tool and the Climate Resilience Platform for supply chain risk and resilience planning.
- Our climate rationale for the public investment case in cacao adaptation shows where cacao faces incremental, systemic or transformational change, giving governments, development funds and NGOs the evidence to justify adaptation programs and investments at scale.

Integrated crop and soil management

- Cadmium levels in cacao beans exceed EU limits in parts of Latin America. With partners, we map and mitigate the risks of trace metals such as cadmium and nickel (Clima-LoCa), including a public regional database and a technique for routine cadmium monitoring.
- We address knowledge gaps in regenerative agriculture on benchmarking, monitoring and improving carbon footprints, soil health and biodiversity across origins.

- We apply agroecological pest and disease management, from early warning for Cacao Swollen Shoot Virus Disease in West Africa to novel pheromones and organic products in South America.



Zero-Deforestation and Resilient Cacao Supply Chains

Why?

Buyers want assurance of zero deforestation and zero child labor, requiring reliable, cost-effective traceability from farm to factory. Smallholders face risks of exclusion from supply chains and information gaps.

How?

Deforestation-free supply chains

- The EU Deforestation Regulation (EUDR) requires operators to prove their cacao comes from plots not deforested after 2020. The Alliance makes digital compliance tools inclusive, as with small cacao farmers in Indigenous areas of Guatemala, where we now add access to finance and tailored climate advice.
- Sample Earth's transparent and locally validated AI-training data lets cacao brands independently check accuracy and inclusion of land-use and forest maps, reducing smallholder misclassification risk by over 80% in pilot countries.
- In Colombia, we co-developed the MRV Protocol for Zero Deforestation, now Colombia's national traceability system, with cacao among the first supply chains covered.

Supply chain risk management

- Our Supply Chain Risk Assessment and Management Toolkit, co-developed with a Dutch development bank and a major coffee trader, has been used to verify West African cacao exporters' supply chains for labor, human rights and environmental risks.
- In Central America, we showed that smallholder-inclusive traceability and compliance data, and the infrastructure to support it, can improve access to financial services and provide strategic planning insights for producers, cooperatives and exporting companies. This can be applied to cacao.
- To better connect smallholder producers and markets, we have applied participatory value chain upgrading and business model optimization approaches, drawing on tools such as LINK.



Value-added Cacao Markets

Why?

Much cacao is sold in bulk, but by differentiating quality and accessing different types of markets, farmers can sell their cacao beans at premium prices.

How?

Superior quality

- Our Cacao of Excellence Program has worked with partners since 2009 to raise cacao quality and its market recognition; its Awards celebrate farmers, flavor diversity and unique origins.
- We co-developed the first global guide for the assessment of cacao quality and flavor, which provides a universal language for describing cacao attributes among professionals and is the basis for sensory training and certification at the unique Cacao Quality Lab in Perugia, Italy.
- In 2026, we launched the first worldwide "Seguine Cacao Auction", connecting past winners with specialty buyers for long-term, high-value relationships.

Bean-to-bar native cacao

- Only a fraction of the genetic diversity in cacao's center of origin, South and Central America, is used in global production. We promote underutilized native fine-flavor cacao varieties, raising their productivity and access to specialty markets.



Leveraged Cacao Partnerships and Policy

Why?

Scaling cacao innovations requires the right incentives and navigating policy, regulatory, sociocultural and value chain barriers. Bridging across public, private and civil society actors is critical to achieve positive change.

How?

Policy engagement

- Our "Six-step Approach" for scaling low-emission food systems, delivering co-benefits while minimizing trade-offs, is being applied in several West African cacao-producing countries.
- For policymakers in Colombia, Ecuador and Peru, we have shown the limits of cacao systems for achieving a living income, and how diversification, minimum prices, area and yields could improve their viability.

Gender and social inclusion

- In South America, labor burdens, access to productive resources and socio-cultural norms can limit women's participation and returns in cacao value chains; we are analyzing producer organization initiatives to address this.
- Supporting Colombia's peace and environmental agenda, we worked with former guerrilla fighters and cacao cooperatives on participatory research, tailored agronomic support, post-harvest management and stronger local organizations.

Regional/international partnerships

- Cacao Connect is a new Italian initiative for more resilient, sustainable cacao value chains in Africa, linking policy, science, communities, responsible sourcing, finance and markets.



Bioversity International

Selected Achievements

- Genetic analysis of 6,000+ samples showed most of the genetic groups linked to fine flavor are found in Peru. Our mapping of **cacao diversity** informed field genebanks, national policy and origin-based branding, and now extends to Ecuador.
- Ghana Cocoa Board (COCOBOD) adopted a national climate-smart cacao extension manual built on Alliance **climate exposure maps**, with mandated extension use reaching about 800,000 farmers.
- Four networks representing 400+ companies selected the Climate Resilience Platform for **climate risk and resilience planning**, powered by the ACLIMATAR database of locally validated adaptation practices.
- Seventeen (17) cacao organizations in Honduras have integrated Producer ID, a **digital traceability system** originally built for coffee, supporting EUDR compliance and first-mile traceability.
- **Portable cadmium testing technology** enabled Peru's largest fine-flavor cacao cooperative to sell 100% of its stock within EU limits, benefiting 800 farmers directly and 3,600 indirectly.
- Participatory conservation planning and geospatial traceability helped cooperatives in Colombia, Ecuador and Peru move from voluntary **zero-deforestation commitments** to verifiable due diligence.
- **Open data for responsible AI:** Our open reference data helps train AI maps to better recognize smallholder cacao and agroforestry farms, and has been adopted by Google's Forest Data Partnership and the World Cocoa Foundation.
- **Cacao of Excellence** has run 10 global award editions, recognizing 300+ producers of excellence, assessing and securing a unique database of 1,500+ bean samples from 55 origins, giving expert feedback to 1,500+ producers and training 400+ professionals.

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The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) is part of CGIAR, a global research partnership for a food-secure future dedicated to transforming food, land and water systems in a climate crisis.

READ MORE ABOUT THE ALLIANCE'S WORK ON CACAO

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