

# Toward a resilient, sustainable, and regenerative agriculture sector



## **Toward a resilient, sustainable, and regenerative agriculture sector**

ImpactoCAF is an initiative created by the Department of Development Contributions and Impact Evaluation, under the Planning and Development Impact Division of CAF. This document was prepared by Lesbia Maris, based on the work of CAF's Technical Advisory Directorate on Biodiversity and Climate, particularly that of Miguel Guzmán.

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## Toward a resilient, sustainable, and regenerative agriculture sector

Latin America and the Caribbean (LAC), with its unparalleled availability of arable land, forests, water, and biodiversity, is one of the world's leading suppliers of agricultural products. The region accounts for approximately one-seventh of global consumption annually and helps stabilize global food prices.<sup>1</sup>

LAC agriculture is also critical for producing industrial inputs such as soybean oil, cotton, cocoa, palm oil, and cellulose, as well as for biofuel production—particularly in Brazil and Argentina, using inputs like soybeans and sugarcane<sup>2,a</sup>.

In addition to its role in food production and other industries, LAC's agriculture sector contributes significantly to the region's economic activity and to reducing poverty and hunger. In 2023, the sector represented nearly 7% of the regional GDP, employed an average of 14% of the population, and accounted for nearly a quarter of annual regional exports. In rural areas, its role is even more prominent, employing an average of 55% of the labor force—and up to 70% in some countries, such as Bolivia and Peru.<sup>3</sup>

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Looking ahead, LAC faces the challenge of sustainably leveraging its vast natural wealth to meet the diverse demands for productive land use.

Looking ahead, LAC faces the challenge of sustainably leveraging its vast natural wealth to meet the many competing demands for productive land use, especially in light of projected global population growth, which is expected to require a 60% increase in food production between 2006 and 2050, according to some estimates.<sup>4</sup> Additionally, the growing importance of renewable energy in the region is adding pressure to convert land for productive use.

Undoubtedly, LAC can play a pivotal role in responding to these global challenges thanks to its immense productive potential—though that potential is unevenly distributed across the region.

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<sup>a</sup> These inputs are used in the production of animal feed, fuels, bioplastics, adhesives, paints, inks, cosmetics and pharmaceuticals, textiles, biodegradable materials, tires, medical supplies, among others.

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Agricultural growth must be accompanied by greater environmental sustainability and should help improve productivity, incomes, territorial equity, and the living conditions of those working in agriculture.

LAC holds the world's largest reserve of arable land—30% of the total—along with 30% of renewable freshwater resources, 50% of global biodiversity, 57% of the planet's primary forests, and a vast array of ecosystems.<sup>5</sup> However, producing more is not enough—it must be done better. This response must be rooted in production practices that are environmentally sustainable, resilient, and regenerative, and that contribute to enhancing natural capital. Moreover, these efforts must acknowledge that agriculture is the main economic activity in rural areas of LAC, where poverty, inequality, and exclusion remain deeply entrenched. Nearly 40% of the rural population in the region lives in poverty,<sup>6</sup> and one in three people experiences moderate severe food insecurity.<sup>7</sup> Agricultural growth must therefore be accompanied by greater environmental sustainability and contribute to improving productivity, incomes, territorial equity, and living conditions for those working in the sector.



### The challenge of increasing productivity

Agricultural productivity growth in LAC is shaped by the region's agrarian structure and the need to use natural resources in a sustainable, resilient, regenerative, and inclusive manner. First, the structure of the agricultural sector in LAC is highly complex, with a mix of production units that vary significantly in scale, efficiency, and specialization.<sup>8</sup> In countries such as Argentina, Brazil, Chile, Mexico, and Uruguay, production in certain agricultural subsectors is dominated by large-scale farms that are highly mechanized and innovative, have access to national and international capital markets, and are well connected to end consumers. In these countries, productivity levels in some crops are comparable to those of the most developed nations.



In the rest of the region, family farming (FF) predominates. In LAC, family farms account for approximately 81% of all production units and generate around 50% of the region's food supply, making them the main providers for domestic markets.<sup>9</sup> Some of these family farms generate economic surpluses



through the sale of most of their output. However, the same segment also includes subsistence producers with limited technology and low levels of productive efficiency.<sup>4</sup>

Likewise, the availability of natural resources for production varies widely across the region. For instance, Caribbean countries have very limited land suitable for agriculture, in contrast to those in the Southern Cone. In both the Caribbean and Mesoamerica, the share of arid land is three times higher than in South America.<sup>10</sup> As a result, the challenge of increasing productivity in LAC requires tailored approaches that address the specific needs of this highly diverse agrarian structure. Commercial farms—whether large-scale or family-owned—must focus on increasing product complexity by adding value to primary production and improving operational, financial, administrative, and technical processes to enable the adoption of new technological packages, including biotechnology, digitalization, and mechanization.

Meanwhile, subsistence family farms face distinct challenges. These include the need to increase production efficiently in order to commercialize a greater share of output and generate sufficient income for farming families. The small scale of their operations limits their capacity to invest in machinery or other high-cost improvements. These units are also the most vulnerable to climate change and degraded ecosystems. Furthermore, subsistence farms often face structural challenges such as high levels of poverty and social exclusion, which severely constrain their potential for productivity gains.

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Increasing productivity in the region is closely tied to rethinking current patterns of natural resource use.

Second, increasing productivity in the region is closely tied to rethinking current patterns of natural resource use. The region holds one of the world's largest reserves of forest ecosystems—considered the most important type of land cover for climate regulation. At the same time, agricultural and livestock



production in LAC are major contributors to environmental degradation. In many areas of the region, these activities depend on practices that deplete natural resources and compromise ecosystem services that are vital to agriculture itself—such as water availability, pollination, biodiversity conservation, and climate regulation, among others. Agriculture—and especially livestock production—is responsible for 70% of habitat conversion in LAC through deforestation and other forms



of land-use change. It also accounts for 70% of freshwater withdrawals and generates just over half of the region's greenhouse gas (GHG) emissions. More than 20% of forests and arable land are degraded due to erosion and unsustainable agricultural and livestock practices, undermining productivity and causing annual losses estimated at between 3% and 7% of agricultural GDP.<sup>11</sup>

In addition, increasing climate variability and the growing recurrence of extreme weather events—such as droughts, floods, and frosts—are having a particularly strong impact on the agricultural sector, especially family farming, which often has limited access to irrigation systems. These changes alter rainfall patterns, thereby affecting crop yields and reducing the extent of land suitable for production. While the effects may be mild or even negligible in the region's more temperate zones, climate change is expected to have highly adverse effects on agricultural production in Mesoamerica and the Caribbean.<sup>10</sup>




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Efforts to increase agricultural production in the coming years must be grounded in the preservation of the ecosystem services provided by the natural environment.

Efforts to boost agricultural production in the coming years must therefore be grounded in the preservation of the ecosystem services provided by natural environments. According to some estimates, the global adoption of more sustainable production models could reduce annual GHG emissions by approximately 25%.<sup>12</sup>

Strengthening agricultural production in LAC through sustainable practices that emphasize regeneration and resilience is essential—not only to position the region as a strategic leader in global agricultural trade, but also to address persistent poverty and inequality. Evidence shows that the poorest households stand to benefit the most from a stronger agricultural sector.<sup>13</sup> In this context, this document outlines the support CAF has provided over the past 11 years to promote an agricultural sector in the region that is not only more productive, but also more economically, environmentally, and socially sustainable.

CAF's work in sustainable agriculture contributes directly to the achievement of the Sustainable Development Goals (SDGs):



## CAF's action and its impact

CAF aims to promote the development of sustainable, resilient, and regenerative agriculture, support sustainable food systems, ensure equitable access to innovation, and strengthen the bioeconomy.



**The strategy for agricultural prosperity, aligned with CAF's transformation into the green bank of LAC, aims to support the productive and sustainable transformation of the agricultural sector through an ecosystem-based approach and integrated natural resource management.**

Between 2010 and 2024, 40 operations related to agricultural development were approved, for a total of USD 3.6 billion. In addition, between 2020 and 2024, 14 financial credit line operations were disbursed for USD 716 million, bringing the total amount financed during that period to USD 4.3 billion<sup>b</sup>. For CAF's impact analysis, following the inclusion and

<sup>b</sup> For more details on these operations, see [CAF's Agricultural Prosperity Strategy](#) document.

analytical criteria of the ImpactoCAF initiative<sup>c</sup>, a subset of these operations in the agricultural sector between 2014 and 2024 is being considered, amounting to USD 1.81 billion.

#### CAF'S ACTION IN THE LAST 11 YEARS (2014–2024)

**\$1.81** billion  
dollars

→ **\$1.75** billion  
dollars  
in 22 sovereign loan operations

→ **\$54** million  
dollars  
in 3 equity investments

→ **\$8.17** million  
dollars  
in 31 technical cooperation initiatives

#### 23 operations

corporate loans and credit lines granted financial institutions that support the agricultural sector

#### 5 operations

in transport, energy, and connectivity that support agriculture

#### 16 countries supported

Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Mexico, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, and Venezuela

**\$140** million  
dollars

in GEF<sup>d</sup> and GCF<sup>e</sup>-managed funding to implement  
**7 agroindustry projects**

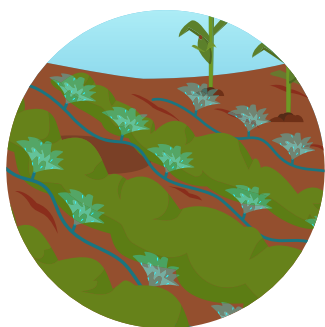
<sup>c</sup> The analysis includes operations approved between 2014 and 2024 that directly benefit agricultural producers. Operations with potential indirect benefits for farmers are mentioned but not included in the financial totals presented in this document.

<sup>d</sup> Global Environment Facility (GEF).

<sup>e</sup> Green Climate Fund (GCF).



CAF has fostered technology and knowledge transfer, expanded the use of irrigation, infrastructure, and financing to support the adoption of sustainable agricultural practices.



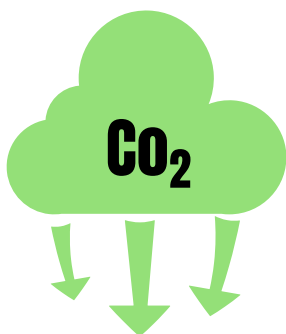
CAF's action spans interventions across multiple sectors and financing instruments. It has supported technology and knowledge transfer to improve agricultural productivity, while promoting more sustainable use of natural resources, environmental protection, and the adaptation and mitigation of agroindustrial production to climate change, for example, through plant and animal biotechnology. A particularly important area of support has been the expansion of irrigation in agricultural and livestock activities. Since 2014, irrigation has accounted for approximately 70% of CAF's approvals in the agricultural sector included in this analysis. CAF has also financed enabling infrastructure to improve market access for agricultural products, drive the digitalization of strategic value chains, and encourage the adoption of technological solutions across the sector. The bank has backed investments in logistics infrastructure to boost the integration and efficiency of agri-food value chains. Acting primarily as a second-tier bank, CAF has mobilized resources to expand and improve the supply of financing for the adoption of sustainable agricultural practices—for example, by supporting larger-scale firms operating in the sector through corporate loans, equity investments, and investment funds.



CAF has also supported the design of interventions in the agroindustrial sector by carrying out diagnostic assessments, feasibility and technical studies, baseline analyses, business model proposals, roadmaps for policy implementation, and public policy guidelines. Areas of focus have included irrigation planning and regulation; value chains for extensive crops; beekeeping; land development; climate change adaptation and mitigation measures; sustainable water and soil management; environmental regulations; sustainable use of native biodiversity; agrologistics infrastructure; and the digitalization of agroindustrial value chains.



CAF's action has focused on supporting technology and knowledge transfer to promote sustainable production in agricultural and livestock systems.



## Strengthening sustainable, regenerative, and resilient production

CAF's action has centered on supporting the transfer of technology and knowledge to achieve sustainable production in agricultural and livestock systems. On the one hand, it has sought to promote production models that consistently reduce the expansion of the agricultural frontier while maintaining a balanced relationship with biodiversity and ecosystems. On the other, it has encouraged practices that enhance production resilience to climate change, extreme weather events, and the reduction of GHG emissions.

In this context, CAF's actions between 2014 and 2024 have included:<sup>f</sup>

### CAF'S ACTION IN THE LAST 11 YEARS (2014–2024)

#### **13 credit and equity investment**

operations approved with components aimed at strengthening productivity

#### **7 technical cooperation initiatives**

#### **2 projects**

implemented with resources managed from the GEF

#### **12 countries supported**

Argentina, Bolivia, Brazil, Colombia, Ecuador, El Salvador, Mexico, Panama, Paraguay, Peru, Trinidad and Tobago, and Venezuela

Technology transfer and agricultural extension services<sup>g</sup> have been the main mechanisms used to engage with producers. One operation supported the production process indirectly by financing research aimed at increasing the productivity and resilience of priority crops in Panama. The initiative promoted changes in production practices, the purchase of inputs, and certification processes.

<sup>f</sup> The number of operations that include at least one component focused on strengthening productivity is counted. Since most operations include multiple components, a single operation may be counted in more than one category.

<sup>g</sup> Extension services generally refer to services provided to agricultural producers that offer assistance and information to help them overcome growth constraints and improve production, productivity, and/or efficiency.

## Agricultural extension

Between 2014 and 2024, CAF approved the following support for agricultural extension services:



### CAF'S ACTION IN THE LAST 11 YEARS (2014-2024)

**8 credit operations**

**7 technical cooperation initiatives**

**2 operations**

with GEF funds managed by CAF

CAF's actions aimed to support producers directly by influencing their production processes and the management of their productive units. At least seven operations targeted beneficiaries from family or subsistence farms; two supported small- and medium-scale producers; and one focused on agro-industrial SMEs.

The areas addressed include sustainable management of natural resources (water, soil, and forests); planning and management of productive units; and, most notably, practices to boost productivity. These include technology adoption, crop selection, and practices to strengthen climate change adaptation and mitigation. Two operations focused on broader efforts to enhance the overall functioning of extension services.

These latter efforts have been implemented through in-person and remote farmer training programs, technical assistance for production, and the establishment of demonstration plots.



In 2021, a technical cooperation was approved in Trinidad and Tobago to promote technological innovations in the agribusiness sector. The operation included funding for demonstration plots designed to help farmers improve crop management and productivity in fruit and vegetable farming through the use of shade houses, drip irrigation, and embryo fertilization.



There is evidence that agricultural extension has positive impacts on production, farmer income, household well-being, and soil fertility.

There is evidence that agricultural extension positively impacts production, farmer income, and household well-being, as well as soil fertility. However, these impacts can vary depending on the content of the intervention, how and by whom it is delivered, and the degree of practical application involved in the extension program. Therefore, while extension appears to be a tool with positive effects, the heterogeneity of results from available evaluations calls for caution when extrapolating findings to other contexts.

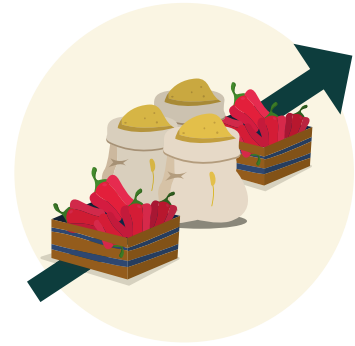
For extension to have an impact on production, producers must first adopt new practices based on the information received. The available evidence on this initial step is limited, although specific programs have shown positive outcomes. Participation in farmer field schools (FFS)<sup>h</sup> is estimated to increase knowledge and the adoption of beneficial practices—such as those related to pesticide management—and to reduce pesticide use by 23%.<sup>14</sup> Although these schools represent just one of many forms of delivering extension services, they are particularly intensive and include a strong practical component, which tends to generate a greater impact than more traditional approaches, such as those financed by CAF.



Evidence on whether extension activities lead to increased knowledge that translates into productive outcomes is mixed. As noted, farmer field schools may raise agricultural yields by 13% and profits by 19%.<sup>14</sup> Other studies that examine a broader set of extension interventions find positive but statistically insignificant effects,<sup>15</sup> impacts of limited magnitude,<sup>16</sup> or a lack of robust evidence of any effect.<sup>17</sup> In the case of extension initiatives that use communication technologies to reach producers, evidence suggests they can increase the likelihood

<sup>h</sup> Farmer field schools (FFS) are knowledge transfer interventions based on practical learning and the farmers' own discovery process.

of adopting recommendations by 22%, which could result in a 4% increase in crop yields.<sup>18</sup> As such, extension activities supported by CAF are expected to help raise agricultural productivity and farmers' incomes, although the precise magnitude will depend on the type of extension, the content delivered, and the implementation context.



Among the factors that may determine the impact of extension, the literature highlights the following:

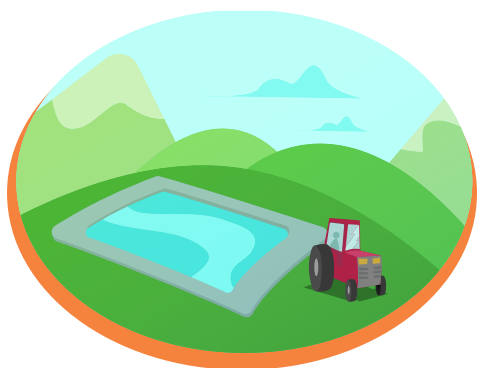
1. the characteristics of the extension agent and their similarity to the beneficiaries;
2. farmers' willingness to share information with their peers;
3. the relevance of the information to the different stages of the agricultural cycle; and
4. the alignment of the content with the context, including the knowledge level of potential beneficiaries. For example, extension efforts that focus on technologies unfamiliar to farmers have greater potential to generate benefits.

Similarly, if the adoption of new practices increases productivity but not profitability, farmers have no incentive to change their practices based on the extension services provided. There is also evidence that extension has greater potential when it complements the provision of agricultural inputs with information on appropriate usage practices.

### **Changes in production processes**

CAF has supported the introduction of sustainable agricultural practices, the incorporation of technology into production processes, climate change adaptation, and improvements in fertilizer use.





Some of the sustainable practices promoted include more efficient water use through reservoirs or rainwater harvesting; the use of shade houses<sup>i</sup> for vegetable cultivation; the adoption of green harvesting<sup>j</sup> in the sugarcane sector; the replacement of technologies to enable cleaner panela production; and the implementation of silvopastoral systems in livestock farming.

Between 2014 and 2024, the approved CAF operations with components supporting the production process were:



#### CAF'S ACTION IN THE LAST 11 YEARS (2014-2024)

### 13 credit and equity

investment operations

### 7 technical cooperation initiatives

### 2 operations

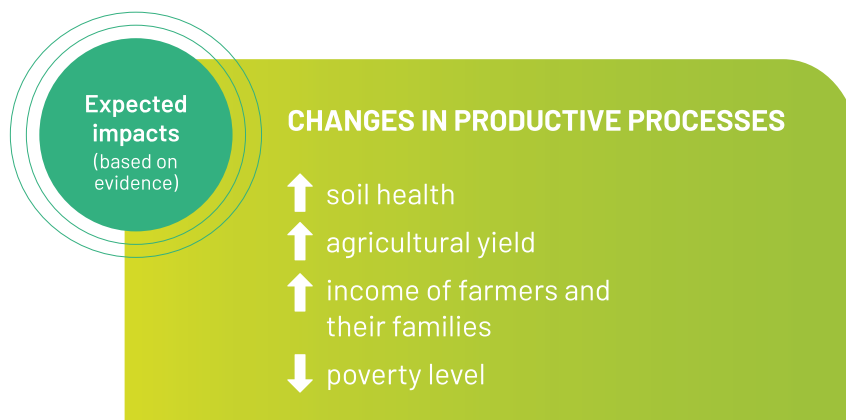
with GEF funds managed by CAF

Ten of these operations benefited family farmers, while two supported small- and medium-scale producers. Four equity investment operations were directed to three large-scale agribusinesses. Lastly, the remaining operations offered potential sector-wide benefits for the broader agricultural sector in the region.

In 2019, a technical cooperation was approved in Ecuador to promote sustainable practices in the production of panela, mortiño (Andean blueberry), and naranjilla (a native Andean fruit), as well as in livestock management. The operation supported, among other actions, efforts to identify best practices for sustainability and climate change adaptation, the dissemination of these practices among producers, and subsidies for 150 vulnerable groups to help cover the costs of implementing climate adaptation measures.

<sup>i</sup> Structures covered with mesh that allow air and light to pass through while protecting crops from sun, wind, and excess water.

<sup>j</sup> Refers to harvesting sugarcane without burning the fields.



Farmer income could increase by approximately 30% through higher production driven by the adoption of new technologies, although results vary significantly across contexts.



The adoption of technology promoted by CAF in the agricultural sector is expected to generate positive impacts for producers. Specifically, farmer income could increase by approximately 30% through higher production resulting from the adoption of new technologies, although outcomes vary widely depending on the context.<sup>19,k</sup>

Evidence on the promotion of more efficient water use is also very positive, though it comes mainly from studies in India and Sub-Saharan Africa. For example, rainwater harvesting could increase cereal crop yields by 19%, while other in-situ water retention techniques may raise yields by 14%.<sup>20,l</sup>

Agroforestry practices supported by CAF, such as the implementation of silvopastoral systems, contribute to improving soil health and strengthening ecosystem services such as carbon sequestration, microclimate regulation, and habitat provision. These practices could positively impact yields and farmer income, although available evidence does not yet show statistically significant effects.<sup>21</sup>

Two CAF-supported operations promoted the adoption of genetically improved seeds. In Colombia, for instance, a loan operation approved in 2022 supported the implementation of climate-smart initiatives, including the use of genetic improvement to increase crop resilience to climate change and promote low-carbon agricultural development. The use

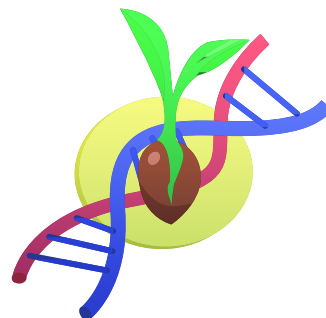
<sup>k</sup> [Stewart et al. \(2015\)](#) base their estimate on five evaluations conducted in African countries. [Kolawole and Olufemi Daniel \(2019\)](#), in contrast, assess only the direction and strength of the causal relationship, concluding that at best the relationship is positive but weak.

<sup>l</sup> Authors' calculations based on effect sizes reported in Magombeyi et al. (2018) and average cereal crop yields in Latin America and the Caribbean, as reported by [The Global Economy](#).

The use of genetically improved seeds could lead to a 35% increase in farmer income and a 4% reduction in poverty levels among beneficiary households.



of genetically improved seeds could lead to a 35% increase in household income and a 4% reduction in poverty levels among beneficiaries.<sup>22</sup>



CAF has also supported the certification of producers as a means to promote the adoption of sustainable practices and improve access to different markets. Support has been provided through advisory services, the promotion of good practices, and technical assistance. Based on existing evidence, certification is expected to increase the prices received by producers by 20%–30%, income from certified varieties by 22%, and overall household income by at least 13%.<sup>23</sup>

### Enabling infrastructure: Irrigation

In LAC, 84% of agricultural activity depends exclusively on rainfall.<sup>10</sup> This not only limits the sector's productivity but also increases its vulnerability to the impacts of climate change. Inadequate water resource management further hinders aquifer recharge, posing a risk to the medium- and long-term sustainability of agricultural activity.<sup>24</sup>



For this reason, CAF's approach to the irrigation sector is grounded in the integrated concept of water security, with the following objectives:

- » ensuring access to water for the population;
- » guaranteeing physical water availability for sustainable productive development;
- » conserving water bodies and ecosystems; and
- » reducing risks associated with water scarcity or excess.



## CAF'S ACTION IN THE LAST 11 YEARS (2014–2024)

### 11 credit operations

↳ \$1.2 billion dollars

### 6 operations

targeting family or subsistence farmers

### 210,000 families + 4,000 agricultural producers

as expected beneficiaries in Argentina, Bolivia, Peru, and the Dominican Republic

### 215,000 hectares

of increased irrigated area expected

CAF-financed activities include:

#### 1. Irrigation infrastructure:

- Dams and reservoirs—regulation works for both droughts and floods.
- Rainwater storage infrastructure.
- Water conveyance and distribution systems.
- Flow measurement and regulation systems.
- Provision of on-farm irrigation equipment.
- Support during the implementation phase.
- Technical assistance and institutional strengthening during the post-implementation phase to ensure sustainability.

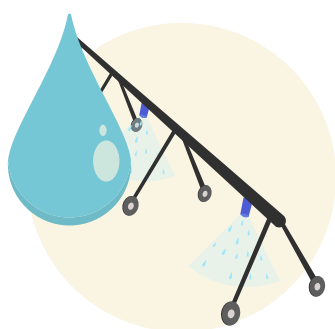
#### 2. Initiatives to improve water management by irrigators:

- Strengthening of irrigation user associations.
- Irrigation modernization.

#### 3. Strengthening the administrative management of institutions that oversee irrigation systems, through enhanced technical and administrative staff capacities and improved water fee collection management.

#### 4. Development and implementation of Integrated Watershed Management Plans (IWMPs) and Local Water Use Plans (LWUPs).

#### 5. Support for initiatives to strengthen early warning systems for water-related disasters.



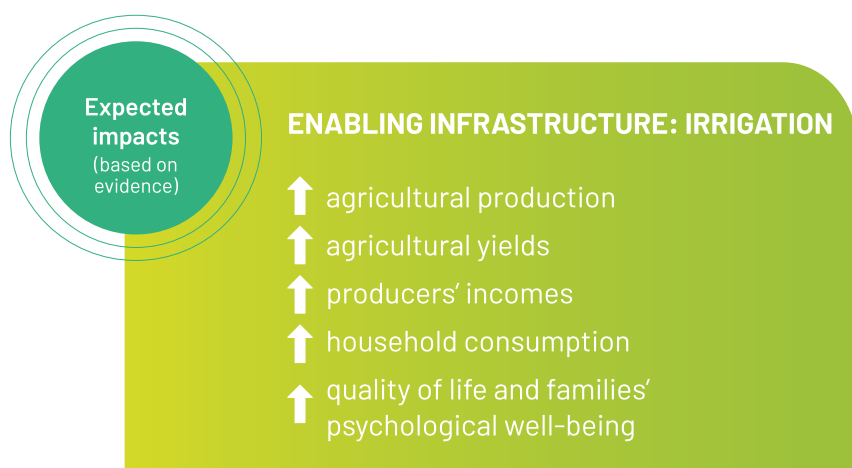
**6. Development of technical standards** for the design and construction of dams in line with international best practices, and capacity building for water management institutions.

CAF's long-standing engagement in irrigation programs has enabled the institution to accumulate lessons learned, which have been progressively incorporated into the design of new operations to enhance the sustainability of water and irrigation investments.

**CAF has played a prominent role in the rural irrigation sector in Bolivia, where it has:**

- » led the implementation of family irrigation systems and the modernization and adoption of advanced irrigation technologies, benefiting more than 40,000 families and improving agricultural productivity across approximately 43,000 hectares;
- » promoted the construction of larger-scale irrigation infrastructure, such as the **Proyecto Presas (Dams Project)** and, more recently, the **Programa Presas Resilientes (Resilient Dams Program)**; as well as improved on-farm support management through the **Proyecto Soberanía Alimentaria (Food Sovereignty Project)**.

These efforts have taken place in a context where the country irrigates roughly one-third of the land targeted in its development plans, although the potential is significantly higher. The Andean and valley regions of Bolivia are characterized by family farming, limited infrastructure, and a high dependency on rainfall. Production is primarily for household consumption, with surplus sold or bartered to meet basic needs.



Irrigation is essential to food systems: 40% of the world's food is produced on just 20% of agricultural land—land that is irrigated.<sup>25</sup> Irrigation not only increases land productivity but is also critical for reducing exposure to extreme weather events, which disproportionately affect small-scale producers.

Access to irrigation enables more precise control over the amount and timing of water applied to crops, directly benefiting crop establishment, growth, and yields. It also allows agricultural production in areas with insufficient rainfall or soil moisture and facilitates agricultural intensification through second or even third harvests. For smallholder farmers in particular, irrigation strengthens the capacity to cope with climate-related disruptions and to plan production—both of which contribute to greater productivity.

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CAF-financed irrigation investments could boost production and yields in the agricultural sector, with positive effects on consumption, income, quality of life, and poverty reduction.

Available evidence confirms that irrigation generates a range of positive impacts. To begin with, CAF-financed irrigation investments could significantly boost agricultural production<sup>26</sup> In the case of large-scale irrigation infrastructure, such as dams, cultivated areas could expand up to fivefold,<sup>27</sup> while yields could increase by 0.34%.<sup>28</sup> Small-scale irrigation projects, such as canals, could lead to a rise in production of up to 7%.<sup>29</sup> In addition, irrigation systems may increase the value of agricultural output,<sup>30</sup> with a high likelihood that these effects will be sustained over time.<sup>29</sup>

Irrigation access can also enhance the productivity of other inputs, such as land, seeds, and labor.<sup>31</sup> While findings vary across studies, irrigation has the potential to increase land productivity by up to 70%.<sup>32</sup> Moreover, irrigation tends to have positive effects on quality of life and poverty reduction.<sup>33</sup> Greater access to irrigation, supported through CAF financing, could raise farmers' incomes by between 10% and 47%,<sup>34</sup> increase household participation in agricultural activities, and strengthen asset ownership, such as livestock holdings.<sup>35</sup>



Higher income, in turn, could lead to up to a 30% increase in household consumption,<sup>36</sup> especially of food, including vegetables and animal protein.<sup>37</sup> These changes could contribute to increased calorie intake and, consequently, to improved food security, potentially reducing rates of anemia and other nutrition-related issues.<sup>38</sup> Finally, targeted studies have shown that access to irrigation can improve families'

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Evidence suggests that small-scale irrigation supported by CAF for family farmers could increase their income and improve food security.

psychological well-being<sup>m</sup> increase women's participation in household decision-making, and even reduce the incidence of domestic violence.<sup>39</sup>



CAF has financed the installation of small-scale irrigation systems<sup>n</sup> benefiting agricultural producers engaged in family farming. Evidence indicates that these types of systems can increase the generation of marketable production surpluses among subsistence-level farming units. This not only raises household income but also helps stabilize income flows, improving both household consumption and food security. In addition, more reliable access to irrigation water could encourage farmers to invest in fertilizers, crop management strategies, and agrochemicals, thereby supporting the intensification and diversification of production. These systems also create opportunities for paid employment and help protect farmers against risks associated with climate variability, contributing to poverty reduction as a result.<sup>40</sup> However, the evidence also shows that small-scale irrigation systems may exacerbate equity challenges for the most vulnerable farmers—those who lack access to these systems or face constraints in accessing markets and productive inputs.<sup>41</sup>

## Market integration and logistics

CAF's action has extended beyond the primary production phase to other segments of the value chain, including processing, marketing, and distribution of production.



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<sup>m</sup> This dimension was measured using validated scales: the Perceived Stress Scale (PSS), Optimism Score, Self-Esteem Score, and the Depression Score (CESD).

<sup>n</sup> These refer to systems that supply water to small-scale production units (less than one hectare). They typically serve individual producers or groups of smallholders and are low-cost solutions. Examples include pedal pumps, motorized pumps, shallow wells, and irrigation canals, among others.

## CAF'S ACTION IN THE LAST 11 YEARS (2014–2024)

### 6 credit operations

with components to strengthen agricultural production marketing processes

### 7 technical cooperation initiatives

with components to strengthen agricultural production marketing processes

### 2 projects

implemented with GEF funds, including:

- training in market intelligence
- development of business plans
- identification of market opportunities
- strengthening platforms that connect producers with buyers

### 8 operations

supported family farmers

### 7 operations

small and medium-scale agroindustrial producers and/or enterprises

Expanding market access has positive—though modest—impacts on variables such as investment in productive units, yields, and household income.

Expanding market access has shown modest but positive effects on several variables across the production chain, including investment in productive units, yields, and household income.<sup>42</sup> Similarly, CAF has promoted access to information and communication technologies (ICTs) in rural areas to improve market connectivity. In Peru, for example, it financed the creation of a company to provide internet services—*Internet para Todos*—and in Argentina, supported the launch of a satellite to enhance connectivity in remote areas. Facilitating producers' access to market information increases their willingness to adopt improved inputs—such as seeds and equipment—and could lead to a 5% increase in both prices received and total household income.



In addition, seven technical cooperation projects have provided resources to improve producers' access to logistics services for aggregation and distribution, enhance product traceability, and guide territorial strategies. For example, in 2020, CAF supported the design of a project to build a meat processing facility in Tenosique, Mexico, to help address market failures in the commercialization of meat products. In Colombia, between 2021 and 2022, CAF supported the development of a technical note on rural agrologistics strategy and contributed to the implementation of the National Agrologistics Plan through the Infraestructura Logística Agrícola (ILA) standard project model<sup>o</sup>. These initiatives aim to inform policy actions targeting both family farmers and micro, small, and medium-sized enterprises (MSMEs).<sup>p</sup>

Providing storage facilities that support the commercialization of agricultural production can help reduce post-harvest losses and increase income. Likewise, creating spaces that connect producers with buyers could raise prices received and household income.

Providing spaces or facilities for storage—when they support producers in the commercialization of their products—also has positive impacts. This type of support could reduce post-harvest losses and increase household income by 8%. Additionally, creating spaces—physical or virtual—that help producers connect with buyers could encourage greater investment in productive units, increase prices received by 11%, and raise total household income by 7%.<sup>42</sup>



CAF has also supported improvements in rural road infrastructure and access to electricity, with potential benefits for agricultural and livestock producers. Examples include the *Proyecto Mejoramiento Caminos Vecinales* (Rural Roads Improvement Project) and the *Programa de Fortalecimiento de la Distribución Eléctrica Rural* (Rural Electricity Distribution Strengthening Program), both implemented in Paraguay. These infrastructure projects could lead to productivity gains ([ImpactoCAF – Sustainable Electrification](#)) and boost commercialization by improving agricultural producers' access to various markets ([ImpactoCAF – Roads to Development](#)).<sup>42</sup>

<sup>o</sup> ILA (Agricultural Logistics Infrastructure) standard projects refer to specialized infrastructure designs for agricultural logistics, including reception, cleaning and sorting, temperature-controlled storage, packaging and labeling, inspection, and distribution to consumer markets.

<sup>p</sup> Acronym for micro, small, and medium-sized enterprises (MSMEs).



## Access to financing for a sustainable agricultural sector

As part of its strategy, CAF has promoted sustainable finance solutions and innovations to facilitate financial inclusion across agricultural value chains, in alignment with Environmental, Social, and Governance (ESG) criteria.

### CAF ACTION OVER THE LAST 11 YEARS (2014–2024)

#### 31 operations

to facilitate access to financing

- **5 operations**  
through loans or equity investments  
↳ **\$304** million dollars
- **22 operations**  
via credit lines and corporate loans
- **2 technical cooperations**
- **2 operations**  
with funds administered from the GEF and GCF  
↳ **\$80** million dollars

#### 11 countries supported

Argentina, Bolivia, Brazil, Colombia, Chile, the Dominican Republic, Ecuador, Mexico, Panama, Paraguay, and Peru

In five operations, the objective was to facilitate financing for the adoption of sustainable practices or technologies—primarily focused on climate change adaptation and mitigation—and to promote the sustainable use of native biodiversity. In Argentina, the approved operation aimed to strengthen productive units by providing working capital, funding for crop replacement and renewal, and production-related infrastructure. Another four operations supported the design and implementation of innovative financial products, while three focused on strengthening the credit process within financial institutions by improving risk assessment and management systems, promoting standardized contracts,

and automating the credit process. These operations also encouraged financing for climate-smart agriculture.<sup>q</sup>

Five operations notably included actions to promote greater financing for environmentally focused agricultural initiatives. These included facilitating linkages between financial institutions and producers; strengthening institutional knowledge of climate change and mitigation projects; and providing training to producers for the development and implementation of climate-related projects.

In the 22 operations involving credit lines and corporate loans, the objective was to provide liquidity to support ongoing agro-industrial operations (in the case of corporate loans) or to expand access to financing within the agro-industrial sector. Of these, seven operations benefited family farmers in rural areas; 19 supported agro-industrial MSMEs; and three were directed toward large agribusinesses.

In 2022, CAF approved a loan in collaboration with the GCF to support local financial institutions in Chile, Ecuador, Panama, and Peru. The goal was to expand their credit offerings for climate change adaptation and mitigation initiatives in the agriculture, renewable energy, and energy efficiency sectors.



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Access to financing in the agricultural sector increases the use of productive inputs, though only among a limited group of producers.

According to available evidence, financing increases the use of productive inputs by between 11% and 35%, although this effect is limited to a relatively small group of producers.<sup>43</sup> As a result, its potential to drive large-scale gains in agricultural production, income, or profitability remains limited. Regarding poverty, the potential impacts of agricultural finance are generally unclear.<sup>44</sup> These results can be explained by two key factors. First, only a minority of farmers typically access credit—an estimated 15% to 30% of farmers would be willing to use the credit instruments supported by CAF. Second, not all of the loan amount is usually invested in productive inputs—it is estimated that only one-fifth to one-third of the financing is actually used for inputs and other business-related expenses.

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<sup>q</sup> Climate-smart agriculture (CSA) is an approach that seeks to sustainably increase agricultural productivity and income, while enhancing adaptation and resilience to climate change and reducing emissions and increasing greenhouse gas absorption (FAO, 2025).



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The impact of increased credit access remains very limited unless accompanied by efforts to address cognitive and behavioral barriers that discourage producers from investing in productive inputs.

Thus, the impact of increased credit access is minimal if it is not complemented by efforts to reduce the cognitive and behavioral barriers<sup>r</sup> that discourage agricultural producers from purchasing productive inputs.<sup>45</sup>

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<sup>r</sup> For more detail on low borrowing levels and credit use decisions in agriculture, see [Bridle et al. \(2019\)](#) and [Magruder \(2018\)](#).

## In summary

LAC—the region with the greatest agricultural potential in the world—faces the dual challenge of increasing productivity while ensuring the sustainable use of its natural wealth.

Between 2014 and 2024, CAF allocated USD 1.808 billion in loan operations, equity investments, and technical cooperation to promote a more productive and sustainable agricultural sector. In addition, it supported corporate loan operations and credit lines to financial institutions and managed USD 140 million in GEF and GCF-administered funds.

Through this support, CAF has potentially contributed to improving the incomes of at least 550,000 families and 210,000 agricultural producers in LAC. It has also promoted more sustainable practices, along with greater climate change adaptation and mitigation in agricultural production. Among the various actions and expected impacts, the following stand out:

- » Support for agricultural extension could improve productivity and increase farmers' incomes, although the exact magnitude depends on the type of extension, the content delivered, and the implementation context.
- » Promoting the adoption of technology could increase farmers' income by approximately 30%, though results vary significantly by context.
- » Encouraging the use of genetically improved seeds could raise household income by 35% and reduce poverty levels by 4%.
- » Producer certification could help increase prices received and household income by around 13%, while support for commercialization could raise income by 5% to 8%.

Irrigation investments could boost agricultural production

- » by between 0.34% and 7.1%, potentially increasing farmers' income by 10% to 47%, and household consumption by up to 30%, particularly of nutritious foods.
- » Expanding access to finance in the agricultural sector could promote the purchase of productive inputs and technology adoption for a subset of farmers. To extend the impact to a broader group of producers, it is necessary to increase farmers' willingness to adopt improved practices and invest in inputs, as well as support their integration into agricultural value chains.



## Reference notes

- 1 [Brassiolo et al. \(2023\)](#) and [Rodríguez et al. \(2019\)](#)
- 2 [USDA \(2024\)](#); [Statista \(2024a\)](#) and [Statista \(2024b\)](#)
- 3 [ECLAC/FAO/IICA \(2023\)](#); [World Bank \(2024\)](#); [World Bank \(2024\)](#) and [BID \(2021\)](#)
- 4 [Morris et al. \(2020\)](#)
- 5 [Rodríguez et al. \(2019\)](#) and [CEPAL/FAO/IICA \(2021\)](#)
- 6 [CEPAL \(2024\)](#)
- 7 [FAO \(2025\)](#)
- 8 [Molina-Millán \(2023\)](#)
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- 19 [Stewart et al. \(2015\)](#) and [Kolawole & Olufemi Daniel \(2019\)](#)
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- 21 [Saliu et al. \(2023\)](#) and [Castle et al. \(2021\)](#)
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- 27 [Cisse et al. \(2024\)](#)
- 28 [Duflo & Pande \(2007\)](#)
- 29 [Asher et al. \(2022\)](#)
- 30 [Garbero & Chichaibelu \(2019\)](#); [Mwangi & Crewett \(2019\)](#) and [Salazar & Lopez \(2018\)](#)
- 31 [Zeweld et al. \(2015\)](#) and [Jordan et al. \(2021\)](#)
- 32 [Garbero & Songsermsawas \(2018\)](#); [Garbero & Chichaibelu \(2019\)](#); [Dillon \(2011 – b\)](#); [Byiringo et al. \(2020\)](#); [Alauddin et al. \(2020\)](#); [Sengsourivong & Ichihashi \(2019\)](#); [Ngango & Seungjee \(2021\)](#); [Adebayo et al. \(2018\)](#) and [Duflo & Pande \(2007\)](#)
- 33 [Garbero & Chichaibelu \(2019\)](#); [Duflo & Pande \(2007\)](#) and [Sekhri \(2014\)](#)
- 34 [Garbero & Songsermsawas \(2018\)](#); [Garbero & Chichaibelu \(2019\)](#); [Adebayo et al. \(2018\)](#); [Do & Nguyen \(2024\)](#); [Salazar & Lopez \(2018\)](#); [Arslan et al. \(2018\)](#); [Zeweld et al. \(2015\)](#); [Dyer & Shapiro \(2023\)](#); [Hagos et al. \(2012\)](#); [Datar & Del Carpio \(2009\)](#); [World Bank \(2010\)](#); [Osewe et al. \(2020\)](#) and [Jambo et al. \(2021\)](#)
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- 42 [Marion et al. \(2024\)](#)
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- 44 [Bernstein et al. \(2019\)](#)
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