



Cesar Cortez

Factsheet Resilience Solutions for the **Rice Sector** in **Colombia**

This Factsheet is a part of the Private Markets for Climate Resilience (PMCR) project to evaluate systematically the potential market for climate resilience solutions in the private sector. Focusing on agriculture and transportation, current practices and opportunities highlight products, services and finance in six emerging markets — Colombia, the Philippines, South Africa, Nicaragua, Kenya, and Vietnam.



Nordic Development Fund



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Rice sector in Colombia

Rice is a key crop in the Colombian agriculture sector. In terms of national production value, rice is the third largest crop, behind coffee and sugar cane, and involves up to 2 million people throughout the value chain. As an important staple of the national diet, rice has a significant role in the country's food security and rural consumption. During the past years, Colombia has transitioned from being a rice importer to an exporter.

Sector-focused studies show that the Colombian rice sector has significant potential that is not being fully exploited.

It is estimated that the sector could grow 60% from current levels. However, rice sector experts consider that current credits and investments are too short-sighted. As the sector needs significant support in reducing costs and ensuring sustainable profitability, financial instruments should have long-term reach. Due to its dependency on water and need for adequate temperatures for crop development, the rice sector is highly vulnerable to climate events and other weather hazards.

Sector facts (2018)

Total production: 2.5 million tonnes

Total area of production: 522,400 hectares (ha)

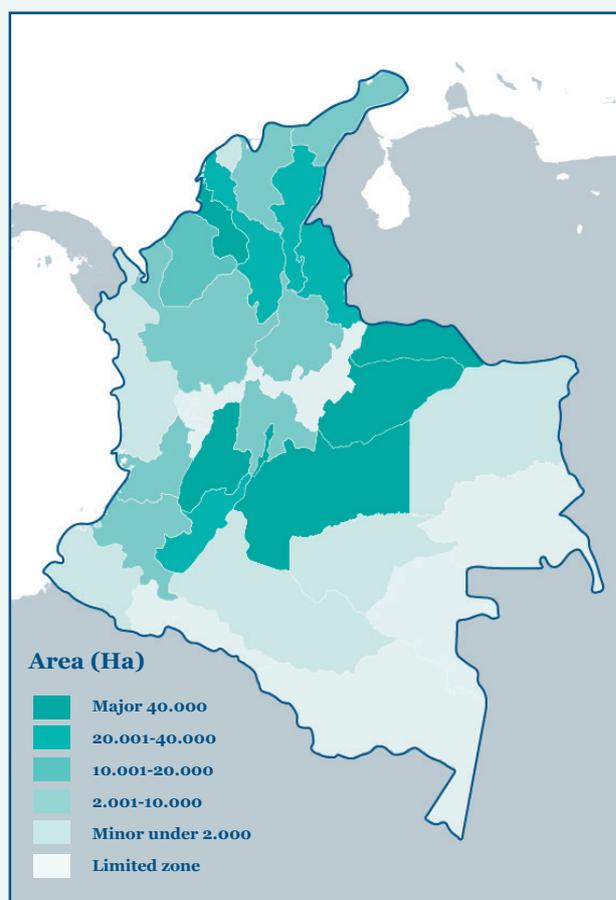
Number, size and types of producers: ~16,000 producers operating 25,000 farms, of which **70% are small** (<10 ha), 25% medium (10-50 ha), 6% large (50-200 ha) and 1% very large (>200 ha).

Type of production: *Manual and mechanized* (99% of total production). *Irrigated* (51% of total production area) and *dryland farming* (i.e. farmland that only receives rainwater).

Average yield: Yields in *mechanized production* range between 3.2 and 6.5 tonnes per ha, while average yields in manual production amount to 1.8 tonnes per ha. The average yield in irrigated systems is 5.5 tonnes per ha and the average yield in dryland systems is 4.1 tonnes per ha.

Sector size, contribution to the country economy: Rice is the third crop in terms of value of national production. Up to 2 million people are involved throughout the value chain. Colombia has transitioned from being a rice importer to becoming an exporter.

Sector association level: Fedearroz is the Rice Producers National Association, representing farmers across the country and acting as a union for coordination and lobbying purposes. Fedearroz monitors impacts of climate events and variabilities to production, and provides a number of services to rice producers, including information and knowledge through sector reports and research, production inputs, financial support, and off-farm processing services.



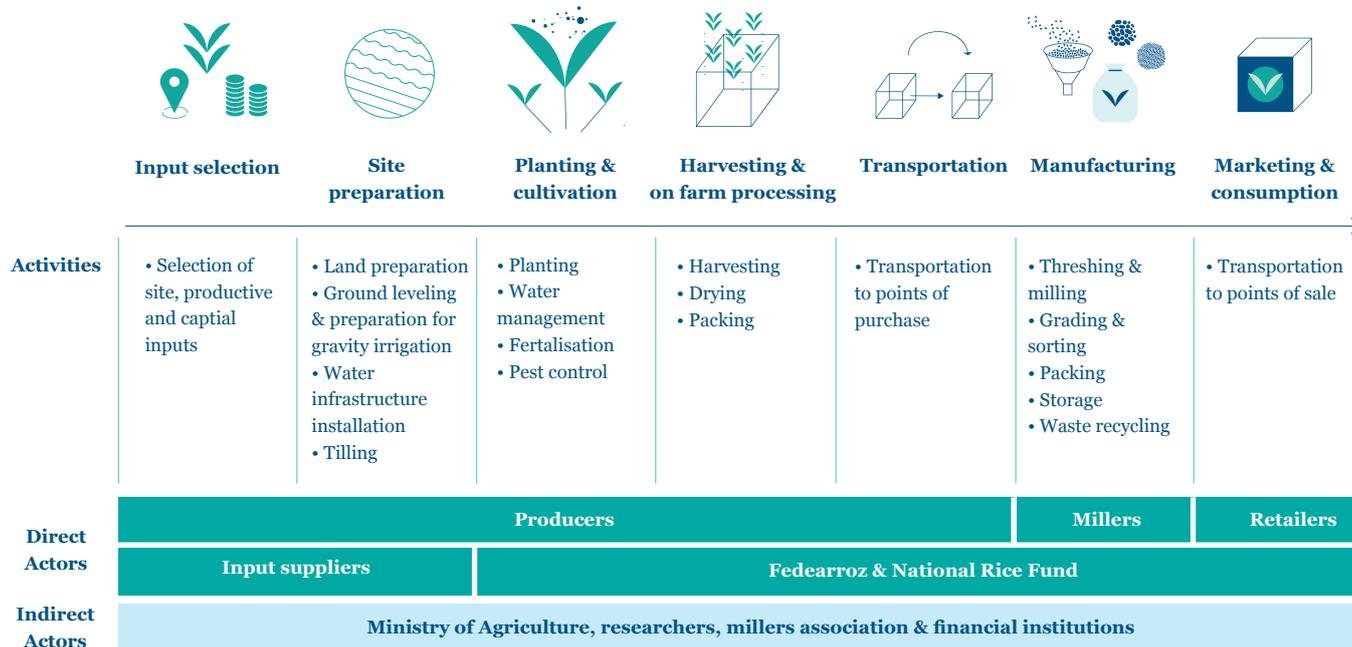
Cesar Cortez

“I have been working on agro-climatic practices for 15 years. Recently on climate projects, collaborating with FAO and the Ministry of Agriculture. I have realised that I have been working on climate adaptation and mitigation technologies since the start of my career, but we did not use those terms before.”
Cesar Cortez, Agricultural engineer

For a list of references, see the References Section of the PMCR Report.

The rice value chain

The rice value chain builds on seven main processes from input selection to marketing and consumption. Each process involves specific activities, which are conducted by direct actors and engage identified indirect actors.



Normal environmental conditions for production

- The production cycle of rice is approximately four months, with two seasons in the farming year: i) January-June, seeing greater planting activity, and ii) July-December, involving greater production.
- *Temperatures* in the main production regions vary between 20-30°C, with the minimum temperature for production ranging between 18-24°C.
- *Humidity and moisture* conditions are key in various processes of the value chain. Production is substantially dependent on water as plants are submerged in water during the vegetative and germination phases. Dry conditions are necessary during the planting and harvesting phases (i.e. no flooding).

Changes in the weather that could affect production

- Variations in *rainfall* affect the optimal timing for planting and can affect harvesting-related operations.
- *Droughts* and *unseasonal dry-spells* can make an entire crop

unviable by affecting water availability in irrigation districts and causing possible water deficits in dryland crops.

- *Higher temperatures* can increase water requirements and high variations between day and night temperatures can have negative effects on yields and production levels.

Main climate-related impacts affecting the value chain

- *Droughts, floods, increased humidity and excess moisture* have significant negative impacts on the entire rice value chain and can result in substantial sector-wide losses.
- *Floods*, mostly related to climate variability and river flooding, are the most damaging climate related events affecting rice production and profitability.
- *Extreme humidity and rainfall* cause difficulties in the preparation of planting areas and harvesting.
- *Landslides* resulting from *floods* or *extreme rainfall* have negative impacts on the value chain, as it makes it difficult to get products to the thresher or the market.

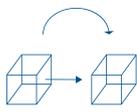


Fedearroz

“The impacts of climate change, and appropriate resilience solutions, vary significantly across the different growing regions of Colombia. The rice federation is investing large amounts of resources in combatting climate impacts as a means of improving production and livelihoods across the country. The federation is engaged in extensive international collaboration to promote its understanding of technical improvements in rice farming, including climate resilience methods.” **Elkin Florez, Fedearroz**

B*Resilient Process Model

Each process of the value chain was assessed using the B*Resilient Process Model (BRPM). This was done in order to identify the climate risks associated with each phase and the resilience options and tools available to address these risks, as well as to achieve specific resilience outcomes. The BRPM analysis of **Harvest and Processing** is presented below.

Resilience outcome	Maximization of production yields and climate-resilient processes		
Process: Harvest & Processing			
	Phase I: Harvest	Phase II: Transportation to the mill	Phase III: Processing
Risks	Floods and excess humidity in planted soils	Landslides blocking roads Floods not allowing cargo to reach the mill Excess humidity can damage grains during transportation	Excess humidity can damage grains
Main Actors	Producers Service providers Fedearroz	Producers Providers of transport services Road operators Fedearroz	Producers Mill owners Fedearroz
Options & Tools	Harvest programing Knowledge services Machinery Agro-climatic scenarios & projections Water sensors in soils	Early warning systems Weather forecasts	Quality control processes Quality machinery

In the context of **climate change**, aspects highlighted to increase productivity and to build resilience in the sector include:

- Critical need for updating irrigation systems, as irrigation is key for the sector’s competitiveness and current infrastructure is not meeting the needs;
- Government needs to actively support the sector, by providing infrastructure required for irrigation systems and funding for production inputs;
- The sector needs to become more environmentally friendly, particularly regarding soil use and management;
- More focus on financial incentives for producers;
- More focus on increasing production efficiency rather than production area;
- Need for improving road network infrastructure;
- Need for updating agriculture legislation, landownership rules, and land zoning plans, among others.



Fedearroz

“The message is simple, but we tend to complicate it. In many cases, despite this is a change on environmental conditions or increased frequency of natural hazards, the real issue is the continuity of businesses and economic activities.”
Everardo Murillo, FND

Resilience solutions

Identified resilience solutions in the rice sector in Colombia vary from *knowledge services* to *machinery, seeds, pest management, equipment, software scenarios* and *infrastructure*, among others.

Leading resilience solutions: *knowledge services, training and capacity building.*

Knowledge services, training and capacity building

Specific services include weather monitoring and forecasting, climate projections and mapping of specific climatic characteristics, agro-climatic models for agriculture yield, and early-warning systems. Training and capacity building involve workshops with producers and other stakeholders (e.g. agro-climatic committees) on the whole range of crop management decisions and practices (e.g. planting and harvesting calendar, irrigation, input use, etc.).

Resilience contribution: Strengthening the capacity of local producers and agricultural institutions (universities, technological institutes, producers associations and local government). Solutions provide tools and information benefiting both sector policy development and farm management practices.

Market opportunities: Increasing awareness and understanding of climate impacts on the entire value chain are driving market opportunities. Recent trends have driven more clients to businesses providing identified services, and government institutions are understanding that local models and local experts provide less uncertainty than international experts, who do not understand the local environment.

Main challenges related to resilience solutions

- The direct impacts of climate change on producers are clear, but most producers lack the financial capacity to purchase knowledge services in order to become more resilient;

- There are significant limitations in understanding the commercial value of knowledge services.
- Limited access to finance as companies providing knowledge services have more difficulties in receiving financing from financial institutions than companies providing machinery and fixed assets.
- Many providers of knowledge services are relatively small in size and lack the capacity to compete with larger, multinational companies.

Greatest opportunities related to resilience solutions

- To better plan and implement all production related processes, producers could particularly benefit from *climate data*, including high-quality *weather data and early warning systems* for extreme weather events.
- Expansion of best practices in *water management* and updating *irrigation systems* are key for the sector's competitiveness and sustainable profitability.
- The sector needs to become more environmentally friendly, particularly regarding soil use and management. As general awareness increases, producers are understanding the added value of quality, certifications and better management of the production process. There should be more focus on increasing production efficiency rather than extending the area of production.
- The sector needs improved access to finance and development of adequate financial instruments and financial incentives. Sector associations, local governments and financial institutions are becoming aware of the financial challenges and constraints that producers face.

Training and Massive Adoption of Technology

The leading resilience service in the Colombian rice sector is the **Massive Adoption of Technology Program, AMTEC**, which combines agro-climatic knowledge services, training and capacity building. The AMTEC program is the approach taken by Fedearroz to combat adverse climate impacts on rice production in Colombia. While all these strategies provided by AMTEC are already available in the market, it is the packaged concept that is making the difference.

AMTEC brings together both resilience solutions and climate-smart agriculture technologies, aiming to improve the sector's competitiveness, profitability and capacity to overcome climate change challenges. By combining various interventions, such as data collection, climate projections, technology transfer, capacity building, and knowledge sharing of good practices, AMTEC supports the decision-making processes of individual rice producers, based on reliable weather information and proven best practices. The model involves all stakeholders across the value chain through the AMTEC platform.

Fedearroz has invested in 41 weather stations & humidity sensors across all regions. Weather information is integrated

with historical production factors such as soil characteristics, water availability and plant variety, and projected forward to inform producers about optimal sowing seasons, best rice varieties for the season, plant nutrition and type of land preparation required, among other key decisions.

These services are key to supporting producers in planning and managing their crops. For example, AMTEC provides information on optimal crop management strategies and supports the elimination of approaches that are not environmentally or agronomically appropriate. According to Fedearroz, it has increased production by up to 1.4 tonnes/ha and reduced production costs by up to 34%.

In 2018, AMTEC was being implemented as a whole, or in part, in more than 60% of the national rice production area. Fedearroz' goal is that over the next 10 years AMTEC will contribute to increasing total production in the sector by 10-40% and reducing costs by 10-30%. These trends are expected to realize gradually, as the program moves from the implementation stage in pilot areas to reaching coverage of 80% of the rice production areas (Fedearroz Strategic Plan 2011-2020).

Climate resilient businesses

Ecosaga is a company specialized in agro-climatic services, with a diverse team of experts in climate, agriculture and hydrology. The company offers services around climate and weather interpretation applied to various sectors and manages a broad portfolio of clients, including research institutions, associations, private companies, international agencies, and NGOs, among others.

The company specializes in weather forecast and short-term climate projections applied to the knowledge of plant physiology and crop management, providing tailored decision-making tools both at the local level and at a larger scale. These tools facilitate actions based on accurate information.

As stated by company representatives, while it might be too early to talk about long-term trends, their experience is that the demand for services increases demonstrably after extreme climate events, such as El Niño or La Niña events. Moreover, there are clear signals that wealthy associations and farmers are becoming more worried about climate variability than 10 years ago and are seeing the benefits of monitoring their farms and crops closely. Insurance companies are also becoming more aware of the benefits of monitoring the weather.

One of the main challenges related to agro-climatic services is that there is still a lot of uncertainty regarding the data, datasets are not complete, and for some areas there is almost no real data. While there is a growing interest in agro-climatic services, few actors are willing to pay a fair price for the services.



A workshop organized by Ecosaga with local farmers on climate data services.
Ecosaga



“We do care about nature, water and the environment, this is why we train our growers and ensure the best practices for producing rice. I had not thought about climate change, but I know our farmers use less water than the average rice producer, our rice is of better quality, is organic and we ensure biodiversity thrives in our producers’ farms.” **Juan Manuel Suzo, Arroz Blanquita**

Arrocera La Esmeralda, known as Arroz Blanquita, has been producing rice for over 60 years and is today one of the most awarded companies in Colombia, and the only certified producer of organic rice in the country. Since its beginnings Blanquita has worked for and on behalf of small rice producers, by providing training and keeping them at the centre of the business. The company engages around 620 producers with farms of less than 5 hectares.

In addition to climate condition, new challenges appear constantly, including pests, labour and land scarcity, price uncertainty, contraband rice, violence, and tax reforms, among others. Despite these challenges, the company has grown and become a leading example in the sector.

Capacity building and trainings are provided to producers with the objective of improving the competitiveness and profitability of their businesses. The practices promoted include land levelling, dry fertilization, less seeds per hectare, permanent flood, agro-chemicals elimination and optimizing water usage. The implementation of these practices have resulted in the doubling of rice productivity per hectare and a decrease in production costs by half.