Photograph: Fundación Bancolombia

Executive Summary

A New Food and Land Use Economy

FOLU Antioquia

The **Food and Land Use** Coalition

foodandlandusecoalition.org | folucolombia.org

The Food and Land Use Coalition, seeks to transform the food and land use systems into powerful forces of sustainable development.

Photograph: Chris de Bode | Panos Pictures

The
Food and Land Use
Coalition

The roadmap towards a New Food and Land Use Economy in the Department of Antioquia (FOLU Antioquia) was developed within the framework of the implementation of the Food and Land Use Colombia Roadmap, boosting the transformation of food systems from the territories.

This document was drafted based on the **FOLU Antioquia Diagnostic** and a process of collective construction involving more than 180 actors and 80 public and private organizations, led and managed by the FOLU Antioquia Managing Group, which included The Antioquia Governor's Office, Comfama, Fundación Bancolombia, Proantioquia, Ecoflora, Alianza Iluma, Corantioquia, Cornare, Corpourabá, the EAFIT University and the Pontificia Bolivariana University as well as the EIA University.

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The opinions expressed and the information included in this document do not necessarily reflect the point of view of the institutions associated to the initiative.

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We will continue adding actors to the FOLU Coalition in order to transform food systems in the Antioquia Department.

Introduction

The world needs to transform food and land use systems in order to feed its growing population, while simultaneously meeting the Sustainable Development Goals (SDGs), the Paris Climate Change Agreements and the Aichi Targets in the Biodiversity Agreement. The term FOLU (Food and Land Use Systems) involves every factor associated to land use, how food is produced, stored, packaged, processed, commercialized, distributed, consumed and disposed of; it also involves all economic, political, social and environmental factors that influence or are influenced by these processes (FOLU 2019).

The Food and Land Use Coalition strives to transform food systems and land use systems as powerful engines of sustainable development.

The initiative connects entrepreneurs, investors, government agencies, scientists, academics, organized local communities, civil society organizations, trade organizations and multilateral organizations at a local, national and international level. As one of the pioneer countries in this initiative, FOLU Colombia has developed the national roadmap, where it has prioritized actions stemming from local territories.

Backed by a strong agricultural tradition, and leading food producing departments in the country, Antioquia decided to bet on developing its own Roadmap, that provides a comprehensive perspective of the main elements that make up food systems.

Photograph: Fundación Bancolombia

The Roadmap was based on the diagnosis of the actual state of the ecosystems, biodiversity, agricultural productivity, food markets, health and nutrition and food loss and waste, dimensions in which the department presents great challenges but also identifies. The development of the Roadmap was consolidated based on the validation and feedback of the diagnostic document. This process involved various participation spaces, among them, a virtual workshop with five working sessions, that was attended by more than 180 people and 80 institutions. Additionally, meetings were held with various institutions and experts that contributed with ideas and a review and analysis of global, national, and local trends in food systems.

The FOLU Antioquia Roadmap suggests actions from four Strategic Axis and Four Transverse Axis thus integrating the actions necessary to transform their food systems. FOLU Antioquia plans on implementing the proposed actions through public-private coalitions, showing the pathway to change and building trust among the different actors, thus demostrating that change is not only necessary but attainable.

Antioquia's society as a whole will hopefully understand the need to recover from the crisis resulting from COVID19 and the climate emergency, and thus decide to transform the current trend of "nature yielding net negative results" to a "positive nature." In other words, food systems contributing towards preserving biodiversity, restoring land, protecting fresh water, storing carbon, generating employment, increasing food safety, and improving climate.

Photograph: Fundación Bancolombia

Growing Better: FOLU's Global stakes

Photograph: Cornare

In its **"Growing Better"** Report, the FOLU Coalition proposes transforming food and land use systems at a global level through 10 critical transitions that enable satisfying the demand for nutritious food, while simultaneously protecting and restoring nature, allowing stronger and more equitable local economies.

These transitions respond to scenarios that have been modeled through 2030, in an agenda that is portrayed as a pyramid for Food and Land Use Systems (see Figure 1). The base or the core of the pyramid contains the necessary critical transformations to guarantee opportunities for all: access to technology and the digital revolution, stronger rural livelihoods, and actions affecting population growth and increasing the number of women participating in decision-making processes.

The second level contains the transitions that allow wider choices and supply, by diversifying protein supply, reducing food loss and waste, and promoting local loops and linkages. The third level seeks nature-based solutions, in which an increase in productivity and agricultural regeneration, protecting and restoring nature, and ensuring a healthy productive oceans, are paramount. In the top of the pyramid the aim is to achieve healthy diets through nutritious food for the entire population.

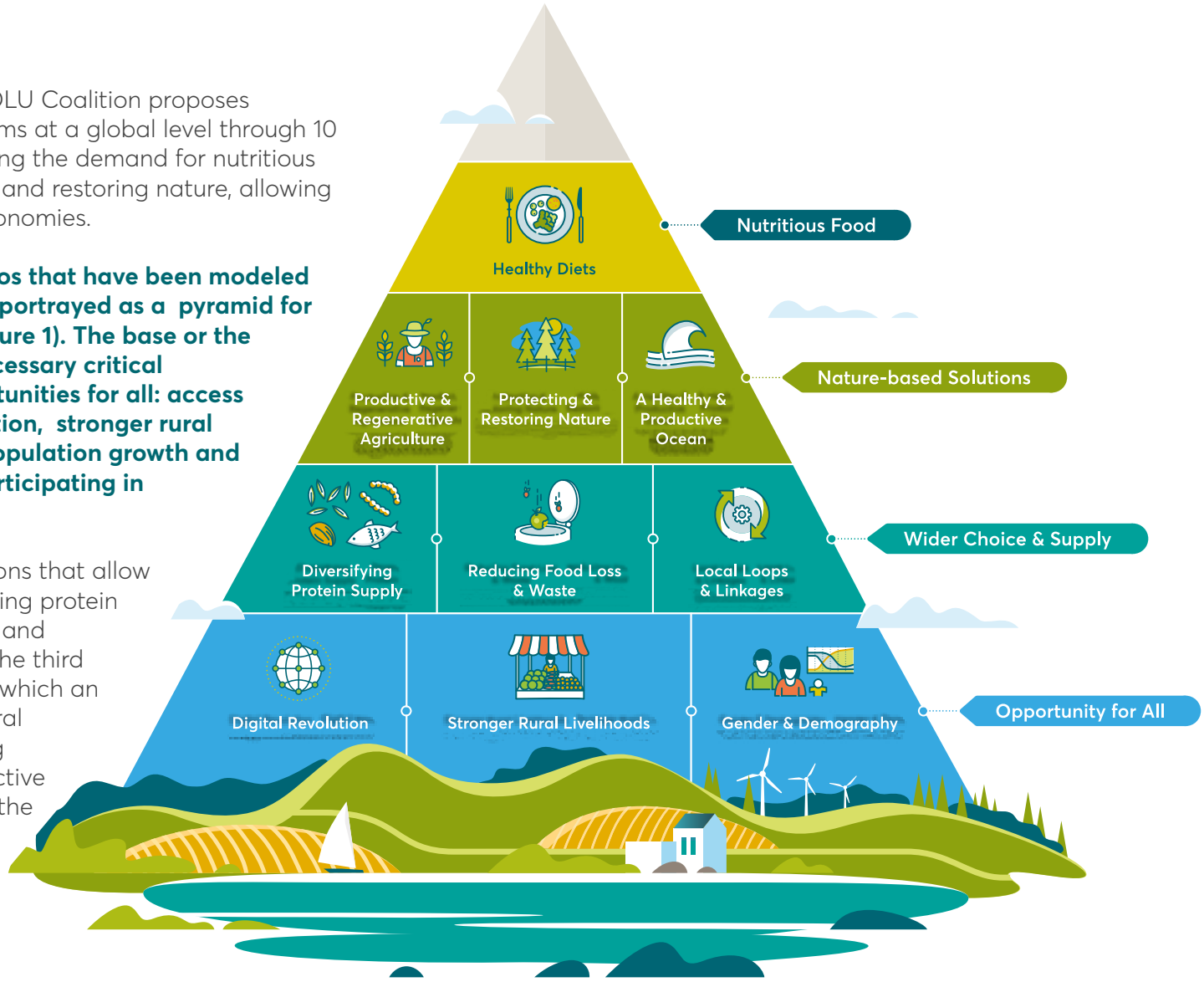


Figure 1 Food and Land Use Transformation 10 Criticial Transitions

Source: FOLU Global Report, 2019

The total estimated and societal economic earnings when implementing these ten transitions and thus reducing the hidden costs of the current food and land use systems are estimated at 5.7 trillion dollars a year by 2030 and 10.5 trillion dollars a year by 2050 (FOLU, 2019). Likewise, rural income will grow 17 % faster than expected by creating more than 120 million new employments and rural areas (FOLU, 2019a). This tendency will help close part of the current gap between rural and urban incomes and reduce the pressure of urban migration.

The report states that the total cost of these transitions is modest as they require reassigning large sums of capital through the existing food and land use systems, without a major increase in the total capital invested. The additional necessary gross investment is estimated at less than [200-300] billion dollars a year and the net capital released by the food and agriculture sectors of the world economy at 100-200 billion dollar per year. This is which is less than 0.2 % of the global GNP; indicating that escalating these ten critical transitions is the better business for the planet (FOLU, 2019).

In this regard, the world is facing an incredible opportunity to transform the food and land use systems in the next 10 years, having the scientific evidence and the economic case that suggest that by 2030, mankind can control climate change, safeguard natural diversity, ensure healthier food for all and create more inclusive rural economies.

Photograph: Claudia Martínez

FOLU Antioquia

Photograph: Comfama

FOLU Antioquia

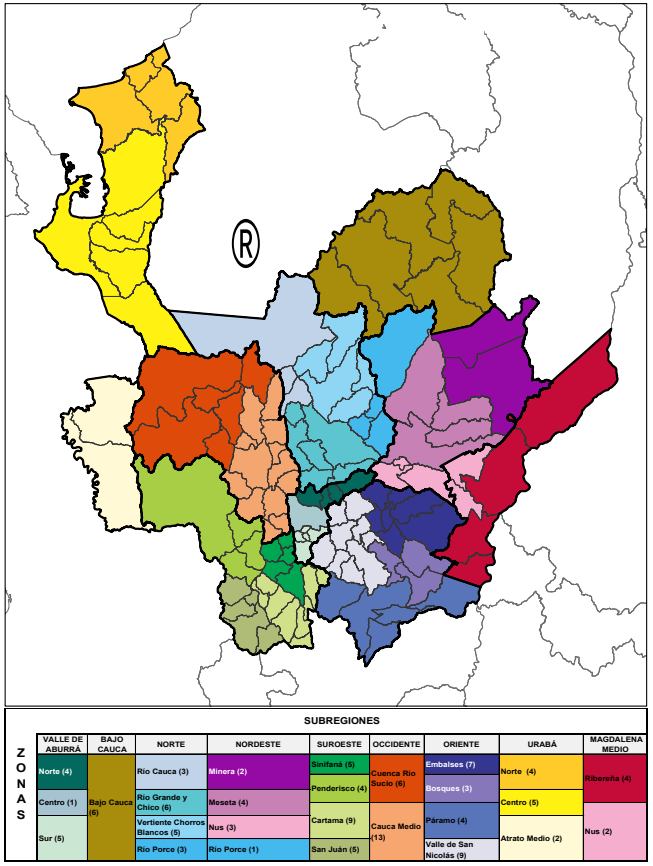
Antioquia is a vast department with a variety of ecosystems and cultures, which has positioned itself as one of the major food producers in Colombia; it faces big challenges and opportunities to transform its food systems into engines for development and equity.

Located in the Magdalena and Cauca river in the central and western Andes, Antioquia has Inter-Andean valleys and outlet to the ocean enable using every climate zone; they also offer a wide variety of ecosystems and cultures and strategic ecosystem services for the department, the country and the world. Antioquia contributes 11% of water resources and 36% of the nation's reservoir areas, two facts worth stressing (Gobernación de Antioquia, 2020; [Antioquia Governor's Office]).

Even so, the department faces great environmental challenges, including the encroachment of the agricultural frontier, high deforestation rates, high soil degradation, water shortage in some regions, and contribution of GGE emissions to the country's climate change, as seen in the FOLU Antioquia diagnostic document.

In regards to land use conflicts, it is important to state that although Antioquia uses 27% of its land for semi-intensive agriculture and only 3% for livestock production, land use in Antioquia is distributed as follows: agriculture (6,69%), livestock activities (41,64%), conservation (35,97%), and forest production (1,1%). As a result, 42% of its territory is overused while 9% is underused (Gobernación de Antioquia et al., 2018; [Antioquia Governor's Office]).

Antioquia has diverse subregions with a variety of features; it has a total of 125 municipalities grouped into nine subregions, which in turn are divided into 27 zones according to geographic characteristics, proximity, access and cultural affinity. Subregions include the Bajo Cauca (Lower Cauca), Magdalena medio (Middle Magdalena), Nordeste (North East), Norte (North), Occidente (West), Oriente (East), Suroeste (South West), Urabá (Urabá) and Valle de Aburrá (Aburrá valley) (see **Figure 2**). Each subregion has transformed its land use in its own way, generating highly diverse socio-economic and nutritional characteristics, which entails thinking of reconfiguring food systems with diverse and innovating solutions in line with each subregion's characteristics and vocation.



Figur2 2 Antioquia Subregions and areas

Source: office the Governor of Antioquia, 2016

Antioquia managed to reduce its poverty rates between 2010 and 2017, from 31.3% to 21.3% respectively, while the national poverty rate in 2017 was 26.9%. It was ranked seventh region in the country for income distribution in 2017 with a 0.496 Gini coefficient, which is lower than the country average (0.508) (Gobernación de Antioquia, 2018; [Antioquia Governor's Office]). However, as the country's most populated department with 6,845,093 people, one fourth of the rural population (DANE projections, 2020), its subregions have enormous poverty and inequality gaps.

According to the Life Quality Survey for 2013, in the Central, Medellín and Valle de Aburrá region, 3.49% of households has at least one basic need unmet (NBI for its Spanish acronyms), while other subregions had 40% indexes, such as the North East (41,86%), Urabá (44.86%) and Lower Cauca (49.42%) (Cámara de Comercio de Medellín para Antioquia, 2019; [Medellín Chamber of Commerce for Antioquia]). Additionally, the department has a wide ethnical variety with 89% mestizo, 10.5 % Afro and 0.5 % indigenous, and faces inclusion and equity challenges.

In terms of food and nutritional security, Antioquia has high malnutrition and undernourishment indexes. Seven (7) out every ten (10) homes faces food insecurity (ISAH), which equals to 67% of all homes in Antioquia, 12.8% higher than the national average (54.2%) (INS, 2015). The department has made meaningful progress, including reducing infant mortality rates in children under five and developing a nutritional profile that has allowed focalizing efficient actions. Also, and like the rest of Colombia, Antioquia loses or wastes one third of the food it produces, with high inefficiencies as seen in the FOLU Antioquia diagnostics.

It is important to stress that Antioquia's institutions are solid and competent. According to the 2019 Departmental Competitivity Index (IDC for its Spanish acronyms), Antioquia occupies the first five positions nation-wide. Institutionally, the department stands out in resource

Photograph: Cornare

management, digital government index, and efficiency of the justice system. Likewise, Antioquia is in the first top five rankings for infrastructure, ICT companies, higher education, and job training, market size, innovation and business dynamism (Consejo Privado de Competitividad, 2019; [Private Competitivity Council]). It also has a strong and entrepreneur corporate group that drives the department's and the country's economic development, and stands out for the growth of newly incorporated companies.

Additionally, Antioquia has a policy framework and a series of instruments for planning and regulating production, improving competitiveness, strengthening markets, and preserving strategic areas and biodiversity in general; the department must continue implementing and strengthening this framework in order to attain the Sustainable Development Goals (SDG) it has set out to accomplish by 2030.

The current Development Plan "Together for Life Unidos por la Vida 2020 – 2023", involves different issues related to the FOLU action guidelines, including reducing barriers to adopt technological innovation public and private digital innovation, strengthening human capital and developing conditions that enable its people to take advantage of the opportunities and challenges of the Fourth Industrial revolution.

Likewise, the Development Plan includes elements for the post Covid recovery, with the understanding that food systems will be affected and consequently, there will be a need to ensure agricultural production, a continuous productive chain and ensure access to healthy and nutritious food.

The FOLU Antioquia diagnostic identifies a context that is favorable in social, economic and environmental terms to transform food systems in a positive manner, with a comprehensive outlook to the future that can in turn transform its economy and the quality of life for people. Based on this diagnosis, the current Roadmap presents the actions that have been prioritized and where the public and private sectors, academics and social organizations can form coalitions to become stronger in implementing concrete actions that will make an impact in the next 10 years, starting now

Photograph: Fundación Bancolombia

FOLU Antioquia **Roadmap**

Photograph: Comfama

The FOLU Antioquia Roadmap was developed through participation, bringing together the ideas of diverse actors that are driving change by 2030. The proposal begins immediately with prioritized and concrete actions in order to reset food and land use systems to make them engines for innovation, development, equity and prosperity.

The FOLU Antioquia Vision connects the purposes of the FOLU global initiative with the FOLU Colombia Roadmap from a regional perspective. Within this framework, the proposal is as follows:

By 2030, Antioquia will transform the food and land use systems into powerful development and equity engines, thus increasing regenerative agricultural productivity, preserving and restoring ecosystems, bringing producers and consumers together with innovative markets, and ensuring healthy and wholesome food to favor the well-being of its people.

The Roadmap is the result of being familiar with the department's status in five big dimensions of analysis: 1) Forests, biodiversity and restoration; 2) Productivity and regenerative agriculture; 3) Agri-food markets; 4) Food loss and waste; 5) Healthy and nutritious food (see **Figure 3**).

Figure 3 Dimensions of analysis in the FOLU Antioquia diagnostic

Source: Self-created.

Likewise, the diagnostic document showed the challenges and opportunities that each scope of the analysis has in order to be able to transform the department's food systems. The comprehensive outlook of these dimensions and the precision thereof in Antioquia resulted in defining four Transverse Axis, as may be seen in **Figure 4**.

Figure 4 Strategic and Transverse Axis of the FOLU Antioquia Roadmap.

Source: self created.

The Roadmap portrays the costs of inaction and the benefits of inaction, the main strategic lines with their actions and sub-actions and presents some successful cases with the purpose of motivating and inspiring actors in the territory to progress decidedly towards transforming food systems in the Antioquia department.

Strategic Axis

Strategic Axis focus on transforming the current trajectory of having "nature yielding net negative results" to a "positive nature," with schemes that renovate and regenerate agri-food systems, so they will contribute to increasing productivity.

It also propose efficient and inclusive market schemes thus fomenting enterprises whose purpose is to have a triple impact (social, economic, environmental). Its purpose is also to be able to place a plate of healthy and wholesome food in front of every individual in Antioquia, reducing food loss and waste (FLW). This will be supported by science, technology and innovation as well as models that are daring in behavior change and more inclusive in education and training with a regenerative focus.

Photograph: Cornare

The **Food and Land Use** Coalition

Strategic Axis 1

Productive and sustainable territories an aquatic systems

Photograph: Fundación Bancolombia

Strategic Axis 1 promotes driving productive and regenerative agricultural projects as well as preserving biodiversity and its eco-systemic services, all of which have the potential of producing healthy and wholesome food for the people of Antioquia.
This requires having a common perspective of the territory as well as planning and achieve sustainability agreements that are beneficial to rural populations. This axis integrates water systems considering Antioquia's long coastline and its marine ecosystems capable of contributing future proteins.

The richness in Antioquia's biodiversity includes its Andean forests and the remnants of dry forest and tropical rainforests still present in its territory, as well a wide variety of species of fauna and flora that enable it to have the greatest number of species recorded (17,522) in the Biodiversity Information System on Colombia (SIB for its Spanish acronyms).

In spite of the positive conditions stated above, the department has eroded its soil and has degraded its ecosystems, which results in a series of conflicts concerning their use. This leads to increased vulnerability to climate change. Between 1990 and 2015, Antioquia's deforestation rate was approximately 20,000 ha per year. Nevertheless, this trend has decreased in the past two years, in tune with the behavior of the nation's deforestation rate (González, et al, 2018).

60.6% of the soil are under severe erosion and records show water shortage in several of the department subregions (the water available in Bajo Cauca, North East and North is unsuitable for drinking) (ADR, et al, 2019).

Likewise, 52% of the Agricultural Productive Units (UPA for its Spanish Acronyms) in the department are under 3 ha, and 35.5% is under 1 ha, which increases the difficulty of establishing sustainable productive processes (ADR, et al., 2019).
These units are characterized by low capital accumulation, low technification and family labor, which contributes to the high informal labor rate in rural Antioquia, a figure that is close to 90% (DANE, 2016).

The inefficient implementation of planning and territorial regulation instruments contributes to the increase of conflicts over land use, with the corresponding costs associated to the ecosystem's loss climate change resiliency.

Antioquia is the department that has the highest carbon emission in the country (22.94 Mt CO2eq). However, it also contributes with the greatest number of absorptions, which brings it to third place in net Greenhouse Gas Emission (GGE) in the country. The AFOLU sector has the greatest contribution in the department in Greenhouse Gas Emission with 49.94%; the manufacturing sector is second with (22.88%) (Gobernación de
Antioquia, 2018; [Antioquia Governor's Office, 2018]).

The department stands out for being a nation-wide leader in certification and adoption of Good Agricultural Practices (GAP) (ADR et al, 2019); even so, its agricultural production is low. For the agricultural sector, this means an average of 9.31 tons per hectare in 2016, and for the cattle sector, 0.88 heads per hectare, as estimated in 2014 (Gobernación de Antioquia, 2016 [Antioquia Governor's Office] and ADR, et al, 2019;). Although the department's participation in the fish farming production is not very important nation-wide, production has been seen to increase, which makes room for new enterprises.

The department's low agricultural productivity is associated with the lack of incentives for productivity and community involvement, armed conflict, low technical assistance and rural education, as well as low technological development (Semana rural, 2019). Additionally, low productivity also relates to the fact that eco-systemic services have lost functionality, which means losing opportunities for sustainable productive development, thus limiting entrance to potential local, national and international markets.

For the department, contributing towards regenerative agriculture could mean reducing water use by 60%, raw materials by 40%, and increasing productivity by up to 20%, capturing between 36 and 45 tons of carbon per hectare (Caetano, 2020).

The strategic lines and main actions proposed in the Roadmap for this axis are summarized below:

Photograph: Grupo E3

Table 3 Strategic lines and actions that have been prioritized for Strategic Axis 1 of the FOLU Antioquia Roadmap

Strategic Line	Actions
Territorial, productive and social planning of property with a regenerative vision	• Implementing the Agricultural Territorial Regulation Plan (POTA for its Spanish acronyms) under a regenerative outlook. • Boosting programs to formalize rural property together with improving a sustainable infrastructure. • Drafting a proposal for regenerative landscapes in Antioquia. • Becoming effective in managing the Departmental System of Protected Areas (SIDAP for its Spanish acronyms), including areas under protection, strategic ecosystems and Complementary Preservation Strategies (ECC for its Spanish acronyms). • Consolidating the SIDAP Antioquia through a conected network.
Agricultural extension and strengthening of local capacities	• A fast and assertive implementation of the Departmental Agricultural Extension Plan (PDEA for its Spanish acronyms), according to the priorities of each subregion. • Implementing farming schools for producers and technicians that drive innovative technology transfer schemes in regenerative agriculture. • Developing an extension program in regenerative cattle farming. • Implementing programs for agricultural production processing and promote a circular economy. • Strengthening joint associations of producers and fishermen in the department with the purpose of increasing productivity.

Nature, science and technology based solutions

- Assessing, adjusting and implementing the Antioquia Forest Development Plan (PDFA for its Spanish acronyms) 2005 – 2040, with the purpose of formulating projects that accelerate its effective and successful implementation with a regenerative focus.
- Strengthening ecological restoration schemes (assisted and spontaneous) as required in degraded areas.
- Boosting enterprises in rural communities in association with private companies of nature-based products based on using biotechnology and bioeconomy.
- Using science, technology and innovation to increase agricultural production in a sustainable manner.
- Boosting value chains that contribute towards configuring restorative landscapes.
- Developing soil restoration and recovery demostrative examples at the landscape's scale through community nurseries and participation in reforestation.
- Boosting the diffusion and use of biologically based agricultural supplies.
- Driving and strengthening wetland protection programs.
- Implementing protection and recovery plans for marine-coastal ecosystems.
- Developing recovery programs for sea and continental water fishing associated to sustainable food systems.
- Driving the development of aquatic proteins through sea, water, and algae farming.

Source: self created.

The Food and Land Use Coalition

Strategic Axis 2

Conscious and with purpose markets and enterprises

Photograph: Éxito wow Villamayor – Grupo Éxito

Axis 2 is addressed at bringing producers and consumers together, through fairer and more equitable schemes and to generate a greater value throughout the food production value chain, as well as new enterprises having a triple impact. Additionally, this Axis proposes improving infrastructure and logistics, including the digital revolution in order to improve market conditions in the department's nine subregions.

Antioquia makes, in average, 17.6% of the country's exports. Which in 2020 reached 31.056 billion dollars. 36.7% of the department's exports correspond to the agricultural sector and agro-industries (ADR, et. al. 2019); the department is the greatest exporter of avocado, coffee, plantain and citric in the country.

However, strengthening association schemes that can provide greater competitivity is paramount. According to the National Crop and Livestock Survey (DANE, 2016), 61% of producers state that they do not belong to any association, a situation that is not beneficial to scale economies, participation in public bids such as Productive Alliances or in bids for national and international cooperation or to access the financial sector in an agile and effective manner.

According to the 2018 National Logistic Survey (ENL for its Spanish acronyms), approximately 12.8% of sales in Antioquia correspond to logistics expenses (DNP, 2018); investing in improving infrastructure is thus paramount. In a scenario of well kept, paved roads for Antioquia, the costs of logistics would drop from 12.8% to 11.2%, which can mean saving a total of 131 billion pesos, just by considering the six products with the greatest production area in the department.

In regards to food loss and waste in the food chain, the largest participation in Colombia is the production of crop and livestock (40.5%), distribution and retailers (20.6%), post-harvest and storage (19.8%), followed by consumption (15.6%) industrial processing (3.5%) (National Planning Department, 2016). This series of problems results to a great extent from the little coordination between the actors in the food supply system, weaknesses in productive systems, bad purchasing and consumption habits, inadequate infrastructure, as well as the lack of efficient logistic systems that meet quality standards to commercialize fresh and perishable products (FAO, 2018).

In regards to digital, physical and logistics infrastructure, increasing its availability and coverage is necessary to strengthen the actors' capacity and articulation, as well as to adopt new technologies and have efficient market access. It is also necessary to generate multimodal transportation strategies and to broaden the infrastructure for collection networks, transformation and distribution, thus strengthening the sector's competitiveness and contributing towards food security.

Improvements in infrastructure and logistics, together with developing direct or short commercialization circuits articulated with circular economy strategies, will benefit consumers, generate greater trading opportunities for producers and motivate new enterprises.

The strategic lines and main actions proposed in the Roadmap for this axis, are summarized below:

Photograph: Corantioquia

Table 2 Strategic lines and actions that have been prioritized for Strategic Axis 2 of the FOLU Antioquia Roadmap

Strategic Line	Actions
Strengthening producers and enterprises in agri-food systems	• Boosting and strengthening sustainable crop and livestock association schemes. • Boosting inclusive enterprises in the subregions that generate aggregate value to crop and livestock products and promote the presence of producers in rural areas. • Strengthening and articulating dialogue spaces with the agencies responsible for surveilling and controlling the food sector and making the commercialization and export processes more agile. • Boosting the strengthening of the crop and livestock value chains in Antioquia through large scale supermarkets or retailers.
Fomento de circuitos cortos de comercialización	• Implementing public policy concerning public acquisitions at a departmental scale that can guarantee a minimum 30% purchase to small and medium size producers. • Establishing and strengthening fair and formalized short trading circuits that guarantee that consumers can access healthy and nutritional food. • Boosting circular economy-based enterprises. • Boosting digital platforms that connect producers and consumers.

Improving the physical and technological infrastructure to strengthen sustainable and regenerative markets	• Broadening and improving the subregional coverage of logistics, collection and marketing centers. • Improving tertiary roads and multimodal transportation systems. • Developing innovative collection and transformation infrastructures for small and medium size producer associations. • Consolidating universal access to Internet in order to promote markets. • Driving digital innovation projects for the crop and livestock sector, boosting the capacities of the actors in the science, technology and innovation ecosystems in Antioquia.
Positioning Antioquia as a production and export center with a regenerative origin	• Developing public/private agreements to consolidate the "Regenerative Antioquia" strategy. • Consolidating "bio" export agreements and contracts with international countries and purchasers. • Implementing marketing strategies that generate healthy food habits.
Empowering consumers that are conscientious, in solidarity and regenerative	• Boosting differentiated markets for conscientious consumers, thus generating enterprises and connections. • Boosting social and environmental certification and labelling schemes.

Source: self created.

The **Food and Land Use** Coalition

Strategic AXIS 3

Healthy and nutritious diets with less food loss and waste.

Photograph: Gerencia de Seguridad Alimentaria y Nutricional de Antioquia – MANÁ

Strategic Axis 3 emphasizes the need to overcome the malnutrition and undernourishment challenges the department faces, boosting actions to diversify diets, with options stemming from cleaner, and hopefully, organic production, taking advantage of the Department's richness in climate and the fertility of its soils.

It also seeks to reduce food loss and waste (FLW), by increasing the options provided by food banks and using a measuring and action strategy to address the points and links where the greatest amount of food is lost or goes to waste.

This Axis strives to influence individuals, whether they are producers, intermediaries in the chain or consumers, by changing behavior in how they produce and consume. Furthermore, it intends to foster more awareness more awareness of healthy and nutritious food and valuing a circular economy, reusage and reducing food loss and waste.

According to the National Nutritional Status Survey (ENSIN), seven out of ten households in Antioquia suffer from food insecurity (ISAH for its Spanish acronyms), which equals to 67% of the total population, 12.8% higher than the national average (INS, 2015). The subregions with the highest percentages of ISAH are the Lower Cauca (87.6%) and Urabá (86%). These two subregions have a high concentration of Indigenenous and Afro-Colombian populations.

On the other hand, 17.4% of children under 5 years of age present prevalence and risk of being overweight or obese, a percentage that is three times higher than the national average (INS, 2015).

Excess weight in children under 5 has progressively increased, from 4.9% in 2005 to 6.3% in 2019.
17.6% of children and adolescents between 5 and 17 years old are overweight and 6.4% are obese. 36.6% of adults between 18 and 59 are overweight and 22.1% are obese (ENSIN, 2015). According to some studies, 43% of the daily energy intake comes from processed foods and ingredients that are characterized by a high content of fat and sugar (Antioquia Governor's Office and Antioquia University, 2019).

Antioquia leads the Nutritional Food Safety Program (MANÁ), which is experienced in plans and projects addressed at guaranteeing access to sufficient harmless and nutritious food in order to meet the nutritional need of the people in Antioquia, thus contributing to a healthy and active life. Through MANÁ, the Antioquia Governor's Office develops Alimentary and Nutritional Security (SAN for its Spanish acronyms) plans and prioritizes them in its diverse development plans.

The Ten-Year Food and Nutritional Safety Plan 2020 – 2031 for Antioquia includes reducing 60% of the waste by 2031, which requires in informed, evidence-based decision making.

On the other hand, the department is fully aware of the food loss and waste problem. The total estimated cost of food wasted by consumers is approximately 439 billion pesos per year. In view of this scenario, Antioquia has enormous opportunities and challenges to feed its growing population in a healthy and nutritious way.

Antioquia has directed actions to fight FLW through two ordinances approved at the Antioquia Departmental Assembly: i) Ordinance number 10 of 2016, "Under which the 'zero garbage' program is institutionalized in Antioquia"; and ii) Ordinance 51 of 2019, "under which the ten-year food and nutritional safety plan in Antioquia 2020-2031 is implemented and other provisions issued. " The above-mentioned plan in its "Science, Technology and Innovation for the Food and Nutritional System" states the "Zero loss and waste" program with different strategy throughout the crop and livestock chain (Gobernación de Antioquia, 2019 [Office of the Governor of Antioquia] & Universidad de Antioquia, 2019; [Antioquia University, respectively]).

Civil society and the archdiocese have played an essential role in reducing and preventing FLW, both nationally as well as in Antioquia; it is important to highlight the role of the Saciar Foundation –Antioquia Food Bank and the Medellín Archdiocese Food Bank, which for the past two decades have acted in the Antioquia territory. The Food Banks, in Alliance with big corporations such as the Éxito Group, have benefitted thousands of people in Antioquia by donating food in ideal condition and rescuing food from the country, additionally benefitting small and medium sized farmers.

Although the department has progressed in these issues, it does not have a roadmap to develop different strategies and initiatives that reduce and prevent FLW in the entire food chain. There is need for a multi-sectorial effort to be able to guide the changes required and implement FLW policies.

Photograph: Cornare

Table 4 Strategic lines and prioritized actions for Strategic Axis 3 in the FOLU Antioquia RoadmaP

Strategic Line	Actions
Guaranteeing healthy and nutritious food for all people in Antioquia	• Implementing MANÁ's Twelve Year Food and Nutrition Security Plan 2020 – 2031. • Strengthening the departmental roundtable and the subregional and municipal roundtables on Food and Nutrition Security. • Consolidating the accountability committees, as well as the follow up, monitoring and control processes to the SAN projects at a departmental, subregional and municipal scale. • Socializing the results of the Antioquia Food and Nutritional Profile and continue with its production. • Boosting transparency and labelling programs concerning each food's nutritional information. • Boosting and carrying out SAN and FLW programs in educational environments that involve students, families and the educational community. • Fostering and developing traditional and vertical vegetable gardens and fair food purchase based on short trading circuits in prioritized educational environments. • Boosting and carrying out SAN programs in labor settings that Foster wellbeing and physical activity. • Boosting differentiated food and healthy habit programs for communities.

Defining goals, measuring and acting to reduce food loss and waste

- Implementing the FLW policy according to the conditions of Antioquia's territory.
- Defining a protocol to measure losses and waste for prioritized agri-food chains.
- Developing FLW measurement pilots in prioritized agri-food chains and adjusting protocols.
- Proposing and implementing differentiated solutions for the different links in the prioritized agri-food chains that present the highest FLW.
- Designing a departmental monitoring, reporting and verification system for FLW.
- Fostering the creation of the Pioneer FLW measuring companies.
- Designing a strategy addressed at changing behavior that has a differential focus and contributes towards reducing FLW in the agri-food chain.
- Boosting programs in the Hotels, Restaurants and Catering (HORECA) sector, that are focused on adopting a business model that foments healthy and nutritional food habits and that generates less FLW.

Strengthening food banks in Antioquia

- Increasing the food banks' capacities by improving their collection infrastructure and their logistics and distribution systems.
- Supporting the creation of the food banks' subregional headquarters in the areas with the highest FLW in the department.
- Motivating food donations by developing and fostering tax, economic as well as financial and non-financial mechanisms.

- Drawing attention to the work of the foodbanks.
- Strengthening the program to recover agri-food surpluses (Reagro).
- Boosting learning schools on FLW to reach more small and medium sized food companies.

Source: self created.

Photograph: Chris de Bode | Panos Pictures

The Food and Land Use Coalition

Strategic AXIS 4

Innovation, science, technology and education

Photograph: Biointropic

Strategic Axis 4 is addressed at attaining pioneer education and training systems with a regenerative focus that stress the importance of food systems, and that attract women, youths and children to participate in the technological and digital revolution, as well as in protecting ecosystems and ancestral knowledge. It also proposes attaining pioneer schemes in science, technology and innovation, bringing universities and research centers together to produce regenerative agricultural technologies, management and food transformation schemes, and scalable models of conservation and restoration.

The department has 983,345 students in its 5,789 schools. Although only 15% of the students attend rural schools, these account for 72% of the total number of schools, which evidences that they are highly scattered in rural areas. Additionally, the number of students enrolled goes down as the educational process and achievement level progress; also, the amount of school supplies is also dissimilar between rural and urban schools. (Proantioquia, 2018b). Many times, schools lack supplies and teacher training. The training of 9,160 rural teachers and the endowment of these schools is necessary to strengthen rural education in Antioquia (Aristizábal, 2019).

On the other hand, regarding the academic programs akin to FOLU, 10% of the students enrolled in college study something related to bioeconomic; in Antioquia 90% of these students are in the Valle de Aburrá Metropolitan Area (Alviar et al., 2020 MIMEO).

In Antioquia an increase in 3.2% of average schooling, would increase the productivity from 9.31 tons per hectare (t/ha) (2017) to 9.6 t/ha. It will also increase the agricultural GDP from 6.7 billion pesos in 2019 to 7 billion pesos (statistics from the National Statistics Administrative Department -DANE)

Antioquia pays a high opportunity cost for the lack of investment in quality rural education; when added to the lack of technification of agricultural activities, it hinders the sector from developing adequately its potential and thus, from having a greater dynamism in its internal departmental economy. This situation is only worsened by the accelerated loss of natural ecosystems, inadequate use of technology, lack of diversification, excess use of agrichemicals and the lack of an effective transformation towards a regenerative agriculture.

In the science, technology, innovation and education (STI+E), Antioquia has made important progress, which is evidenced for

example, by the number of patents and research groups. Throughout 2016, requests for agro-industrial patents came from 19 of the 33 departments; Antioquia was second with the highest number (16.3 %). Colombia acknowledges 4,638 research, technological development or innovation groups, but only 249 relate to agricultural sciences; Antioquia accounts for 12% if these groups (Colciencias et al., 2016).

There are limited results from the research in sustainable food in the department, which points a finger at three aspects: first, concerning the contents of the technological transfer schemes given to producers; second, regarding the amount of research groups on agro-industrial matters; and third, a reflection of the previous two, concerns availability of bio-inputs in the market. While there are only 303 types of registered bio-inputs available in the market, agrichemical products have 2,300 types (Biointropic, 2019).

Additionally, the food industry, together with the actors of the STI ecosystem, must make further progress in researching and generating food that contributes towards health and meets the food needs of each population group, including functional foods; in addition to having basic nutritional properties, functional foods have a beneficial effect on health.

Antioquia has the highest participation in investment associated to research and development: 31.6% of the national total for the period between 2017-2019. Even so, its investment is still low compared to the department's needs (Alviar et al., 2020 MIMEO). A 1% increase in Investment and Development is estimated to reduce rural poverty levels by 1.83% (Asenso-Okyere & Davis, 2009).

Simultaneously, Antioquia has been consolidating a Research, development and innovation (in Spanish, I+D+i) with participation of the G8 Universities and support from the Ruta N and the University-Industry-State Committee (CUEE), thus defining the regional agenda on this matter, the purpose of which is to attain sustainable and inclusive territories.

The department is a pioneer in Communications Technologies (ICT), but it needs to orient its development towards revitalizing rural areas, thus increasing the introduction of dedicated internet, which according to the Ministry of Information and Communication Technologies, attained a mere 17.5% in 2019 (Ramírez, 2019). Moreover, seven out of ten people living in rural areas do not use technology, because either they do not have the skills or lack electric power (Mesa, 2019).

The Antioquia 2020-2023 Development Plan has the "Competitivity for the future Antioquia 4.0" which plans investing 172,919 million pesos, 0.91% of the total budget for the triennium, to generate benefits based on new technologies in favor of the productive sector; this is addressed at augmenting the potential of each subregion and integrating new challenges to an agenda addressed at sustainability

The digital revolution is helping collaborative agri-food systems and remote education, making it easier to reach the target audiences. Thus, strengthening competitivity by promoting and using ICT that enables developing information systems that are accessible for decision making, as well as changing behaviors, from producers, to consumers, is a must.

It is necessary to make progress in programs geared towards agriculture 4.0 that reinforce circular economy. Making progress in areas concerning bioprospecting metabolites and producing bioproducts is also necessary, with knowledge management and technology transfer, thus reaching small producers (Colciencias et al., 2016). Furthermore, it is also necessary to offer a mixed education that integrates traditional wisdom with an exchange of knowledge

throughout the entire school cycle and that involves peasants, members of indigenous groups, women and youth from each territory.

Given the particular relevance of HORECA sector in food systems, developing programs focuses towards changing behaviors based on consumer awareness is paramount; this strategic line suggests actions in education that can influence this sector.

The strategic lines and main actions proposed in the Roadmap for this axis are summarized below:

Photograph: Grupo E3

Table 5 Strategic lines and prioritized actions for Strategic Axis 4 in the FOLU Antioquia Roadmap

Strategic Line	Actions
Education to transform food systems	• Designing and implementing educational programs throughout the school cycle, which combine diverse disciplines on food systems. • Designing and implementing agricultural education and extension programs on regeneration and conservation that are addressed at food system producers. • Developing the rural youth program as food system leaders. • Establishing a departmental SAN and FLW training program for the HORECA sector
Boosting the technical revolution for rural areas	• Making alliances with institutions specialized in digital technologies to develop technology transfer packages that reach small and medium sized producers. • Providing education in the use of geographic information systems – GIS and soil monitoring systems that can consolidate land regulation models and good soil use. • Developing technological platforms to integrate food demand and supply.

Source: self created.

Innovation for the food system revolution

- Fomenting and strengthening research lines addressed at regeneration and productive restoration.
- Taking advantage of the traditional wisdom of different communities in sustainable management of food systems and increasing their knowledge.
- Investigating circular economy alternatives of the resources in agri-food chains.
- Stimulating research in the food industry focused towards adopting practices to generate healthy and functional foods.

Source: self created.

Photograph: Confama

Transverse Axes

Transverse axes are essential to bringing public and private actors together in transforming food systems having a comprehensive perspective, with governance systems and daring policies. They also seek to attain greater awareness and changes in behavior to influence how food is produced, commercialized, and consumed. They suggest innovating financing schemes to ensure early investment and essential monitoring and follow up schemes to evaluate the impact and transformation.

Photograph: Corantioquia

Transverse Axis 1. Governance

The Governance Axis boosts trust building processes between actors in the territories, which are materialized through multi-actor sand multi-level strategic alliances, thus producing coordinated action, better opportunities for enterprises and respectable jobs in rural areas and the inclusion of different human groups, including indigenous communities and smalholder farmers, women and youths.

Antioquia has strong and competent institutions that facilitate the formalizing of public-private alliances and coalitions, essential to consolidating a governance that guarantees the implementation of the FOLU Antioquia Roadmap. The coalition created by CUEE has contributed greatly towards the development of the department. On the other hand, reinforcing productive agricultural alliances and creating "Headlights" at the subregions is essential; such is the case of Parque Biosuroeste, which is located in the region bearing that same name and which brings public and private agencies together for a common goal.

Additionally, the work the Autonomous Regional Corporations are undertaking in environmental matters needs reinforcement through public-private actions and with a broad participation from civil society. It is also important strengthen and innovate relations with public agencies responsible for the policies, transparency and regulation of the food sector, including Invima, ICA and the Health Secretariat. It is essential to develop aspects such as transforming production and packaging, thus facilitating commercialization and exports.

Antioquia has many corporate groups that foster the department and the country's economic development. The department is a leader in business, which facilitates the creation of coalitions that support the strategic axis of this Roadmap. However, attaining further collaboration between sectors is still a challenge, particularly between the agricultural and forest sectors, to be able to encourage associations and the sponsorship of small and medium size producers, to drive regenerative and inclusive rural development.

Transforming food systems requires integrating actions that aim towards regenerative agriculture, conserving and restoring nature, ensuring sustainable markets with loops and linkages and promoting healthy and nutricious diets. This will require advancing in a comprenhensive food and land use policy that is effective at a departmental and subregional level.

The strategic lines and main actions proposed in the Roadmap for this axis are summarized below.

Table 6 Strategic lines and prioritized actions for Transverse Axis 1 in the FOLU Antioquia Roadmap

Strategic Line	Actions
Public-private governance mechanisms	• Strengthening institutional capacities to design and implement public policies concerning FOLU issues. • Strengthening institutional coordination through University-Industry-State Committees (CUEES). • Strengthening ethnical and peasant communities' capacities to associate, influence and participate in decision-making forums concerning food systems. • Strengthening public-private coalitions to implement to FOLU Antioquia roadmap. • Drawing attention to and promoting leaders in FOLU issues that drive changes in the territories.

Source: self created.

Photograph: Corantioquia

Transverse Axis 2. Communication and Behavioral Change

The Communication and Behavioral Change Axis emphasizes the need to place food systems at the core of the department's priorities, raising awareness on the need to change how food is produced and consumed. It states strategies for communication and changes in behavior in order to attain the FOLU Antioquia Vision, integrating natural ecosystems, agricultural and marine coastal production systems, as well as healthy diets and reducing food loss and waste. This means promoting a regenerative culture and economy, and empowering women, children, and youth.

Redirecting agricultural priorities to achieve regenerative food systems that move from production focused on a few products to one that is diversity-based, requires efforts in developing and transferring science, technology and innovation. It also requires assertive communication that modifies market demands.

Likewise, changing consumption patterns towards healthier diets, not only implies producing harmless and nutritious food that can be easily accessed and paid, but having the information to train and educate the population on healthy food habit.

Communications is also needed to help rduce fod loss and waste along the entire food supply chain. This includes clear and timely messages about the needs and opportunities associated with FLW.

Raising awareness in the people of Antioquia concerning the connections between all the dimensions that make up FOLU and how these affect their lives, is an essential purpose to generate changes in behavior. Fostering conscious capitalism at a corporate level, a concept already being led by Comfama's top directors (COMFAMA, 2020), is also strategic. Conscious capitalism proposes developing and adjusting businesses so they may create value and wellbeing, thus having a positive impact on the world. In this regard, companies make an effort to create financial, intellectual, social, cultural, emotional, spiritual, physical and ecological richness for all its stakeholders (Conscious Capitalism, 2021).

The strategic lines and main actions proposed in the Roadmap for this axis are summarized below.

Table 7 Strategic lines and prioritized actions for Transverse Axis 2 in the FOLU Antioquia Roadmap

Strategic Line	Actions
Communication actions to transform behavior related to food systems	• Analyzing consumption, commercialization and production patterns that determine how of the people of Antioquia behave towards FOLU. • Creating a coalition of actors that drives communication campaigns on different aspects of FOLU. • Designing and implementing communication campaigns concerning FOLU issues, differentiating segments by subregions, sectors and age groups. • Designing cultural and artistic initiatives oriented to behavioral changes. • Designing communication tools and platforms on FOLU issues, particularly for children and youths. • Designing strategies to exchange knowledge between cities and rural areas in order to encourage a change in behavior.

Source: self created.

Photograph: Comfama

Transverse Axis 3. Innovative Financing

The Innovative Financing Axis presents different options to ensure blended finance, thus boosting inclusive economic and financial schemes that contribute to sustaining the actions proposed in the Roadmap. It also presents existing financing options in Colombia that could be taken advantage of to make progress in the actions proposed.

In its long-term 2020-2023 investment plan, the Antioquia Governor's Office includes investments in different FOLU areas such as education, competitiveness of the agricultural sector, infrastructure with a social purpose, digital Antioquia, sustainable mobility, food and nutritional security, and environmental management. These resources must be complemented with investment in the private sector, in addition to different financing options, both national and international.

It is necessary to combine concessional funds from the national government with funds from multilateral or donating banks that can leverage the financial risk during the first stages of investment and until profitable and sustainable schemes are attained.

It is also urgent to broaden and strengthen the portfolio of products and services in the banking sector, including micro financial for different sectors associated with the agri-food system with the most inclusion in rural areas. Setting up state of the art financial and economic instruments that provide the right signals to boost the sustainability of food systems is also essential.

The strategic lines and main actions proposed in the Roadmap for this axis are summarized below:

Photograph: Chris de Bode | Panos Pictures

Table 8 Strategic lines and prioritized actions for Transverse Axis 3 in the FOLU Antioquia Roadmap

Strategic Line	Actions
Financial mechanisms to boost food systems	• Developing credit lines that are accompanied with technical assistance. • Boosting banking usage and rural microcredit programs, thus adding technology transfer schemes. • Developing "Hybrid financing schemes", including Green bonds. • Driving project development and the financing thereof through the national royalties' fund and other national and international funds.
Economic and financial Instruments for FOLU	• Developing a diagnosis of economic and financial instruments used in Antioquia, understanding the challenges and possibilities to attain greater incentives in order the apply them to FOLU issues. • Taking advantage of the compensation schemes in mining and energetic projects in order to finance pioneer regeneration and restoration projects. • Developing an internal carbon market that makes climate change actions in Antioquia. viable • Motivating payment schemes for environmental services in the different subregions, incorporating the private sector into conservation.

Source: self created.

Public-private financing schemes

- Boosting agricultural programs by executing incentive-rich contracts with producers that bet on regenerative production.
- Developing agreements that have a triple impact in priority value chains in the department; that incorporate shared value schemes for every link, with sustainable financing and technology transfer schemes.
- Developing insurance schemes that can consider the risks associated with climate change and the risks of natural disasters, with the purpose of increasing trust in agricultural investment.

Source: self created.

Transverse Axis 4. Monitoring and Follow Up

The Monitoring and Follow Up Axis encourages a robust information systems for the implementation of the actions proposed in this Roadmap and its progress. This Axis is intended to bring actors in the territory together, identify, what, when and who will contribute towards the actions and recommendations of this Roadmap, understanding that, over time, the Roadmap can be adjusted according to the changing contexts and the urgency to act.

Implementing this Axis requires defining schemes that allow assessing advances and progress of the prioritized actions. The information, measuring and monitoring of FOLU issues already exists, most of which is national.

At a departmental level, Antioquia has the Antioquia Data Portal, created by the Administrative Planning Department of the Governor's Office; this platform allows accessing different planning instruments such as the Agricultural Territory Regulation Plan (POTA), the Antioquia Road System (SIVA), the Antioquia Statistics Yearbook, the Antioquia Economic Accounts, the Antioquia Economic Accounts, the Geographic Visor and the Indicators' System. These instruments give access to recent georeferenced statistic information (Antioquia Datos, 2018,[Antioquia Data]).

Additionally, the Tourist Indicators System for Medellín and Antioquia (SITUR) exists for market indicators relevant to the agri-tourist sector.

In regards to agri-food systems, the food and nutritional safety departmental strategy (SAN) is developing measuring systems such as the MANÁ Management Monitoring (SISMANÁ) and the Departmental System for Food and Nutrition Surveillance (SISVAN). However, there is need for a FLW measuring system within the framework for which DANE is responsible under Law 1990 of 2019.

Bearing the above in mind, there are two expectations: first, having systems in place that can measure the actions undertaken in Antioquia in terms of FOLU issues, particularly matters concerning deforestation, agricultural productivity, markets, food safety and food los and waste. Second, the need to follow up on the implementation of the actions proposed in this Roadmap, building the progress and evolution indicators from the corresponding baselines. To this end, it is important to create the FOLU Antioquia Observatory, led by a coalition made of the Antioquia Governor's Office, universities that are Avant-guard in generating knowledge and researching FOLU issues and other departmental and national agencies.

The strategic lines and main actions proposed in the Roadmap for this axis are summarized below:

Table 9 Strategic lines and prioritized actions for Transverse Axis 4 in the FOLU Antioquia Roadmap

Strategic Lines	Actions
Information systems for FOLU decision-making	• Defining change indicators to measure the food systems' transformation processes. • Creating the FOLU Antioquia observatory. • Developing intersectoral and administrative agreements to monitor and follow up of FOLU issues, particularly between universities and research centers. • Giving mutual support in global initiatives to monitor the changes in food systems in Antioquia

Source: self created.

Photograph: Cornare

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Next Steps: Decision-making and acting

There is a marked difference between a world that has decided to transform its food and land use systems and one that continues with business as usual, in which environmental degradation and global warming as well as poverty and inequality become more profound.

Choosing the path of transformation will make Antioquia the pioneer department in food systems, thus producing healthier, nutritious and accessible food under regenerative models. It is also the path towards generating more triple impact enterprises, positively affecting employment and competitiveness in food markets.

Placing stakes in this change will be a safe path that will allow the department to continue progressing in complying sustainable development objectives and the national climate change goals. Today, there is an opportunity to build regenerative systems that provide more innovative and trustworthy solutions in addition to economic benefits distributed in a more just manner.

Taking advantage of this opportunity requires a collective and determined action to implement the recommendations contained in this Roadmap. It is thus urgent to continue boosting a change coalition with the Antioquia Governor's Office, the municipalities, regional and national public agencies, the private sector, agricultural producers, consumers, academics, civil society, indigenous and Afro-Colombian communities, youths and women.

A comprehensive vision of food systems demands a collective awareness of the interdependence between natural and productive systems, as well as between consumption and planet degradation patterns. This warrants a change in how we educate ourselves and how we educate the generations to come.

Antioquia's privileged geographic position, its wide variety of ecosystems and cultures, the strength of its public and private institutions that have a tradition of articulation processes and collaborative work and the drive of the people of Antioquia, are what make the vision possible. Already, there are many actors in the area working to show the way through innovation and creativity.

There is no time to lose. The next ten years are crucial to attain the results required, escalating actions from each subregion in the department towards food and land use transformation, with clear benefits on the prosperity and well-being of all Antioquia.

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