Livestock Carbon Projects in the Voluntary Carbon Market: Science, Tools, and Opportunities

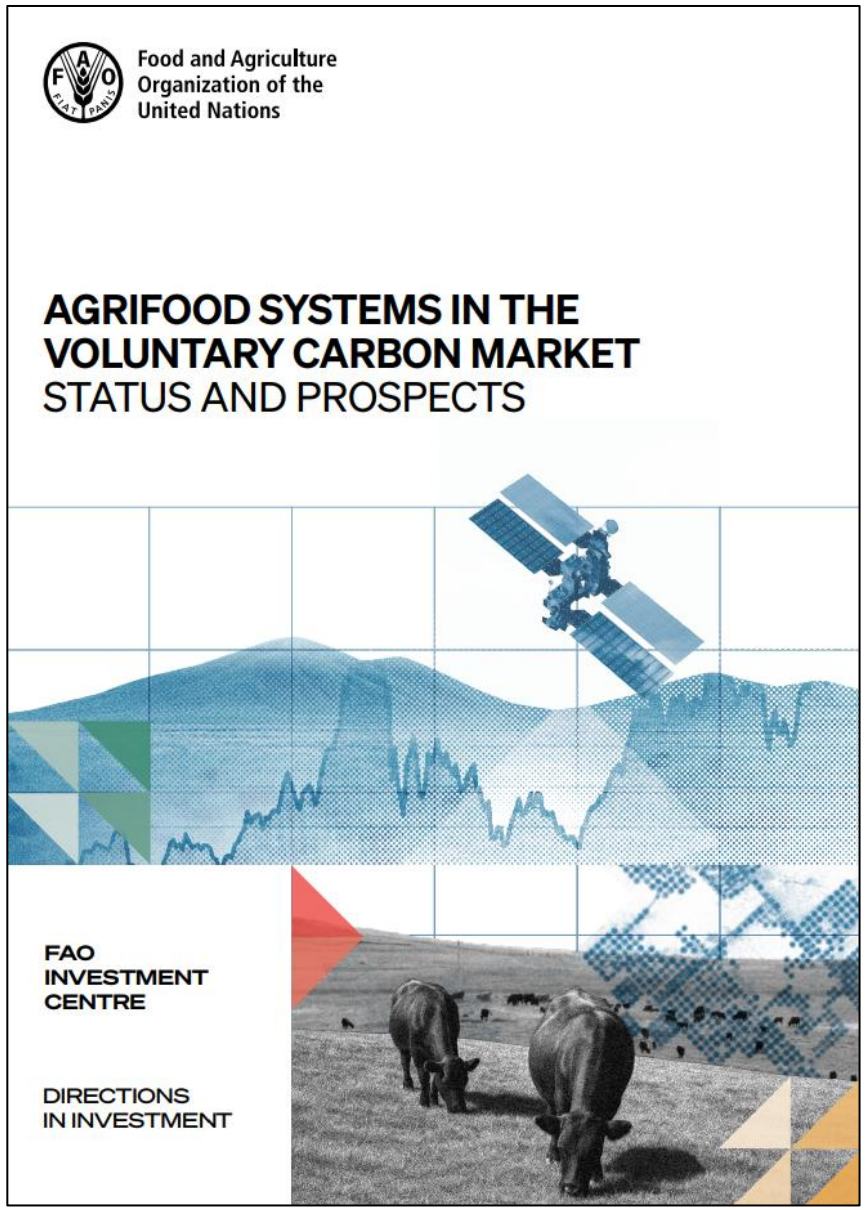
Ciniro Costa Jr

Scientist

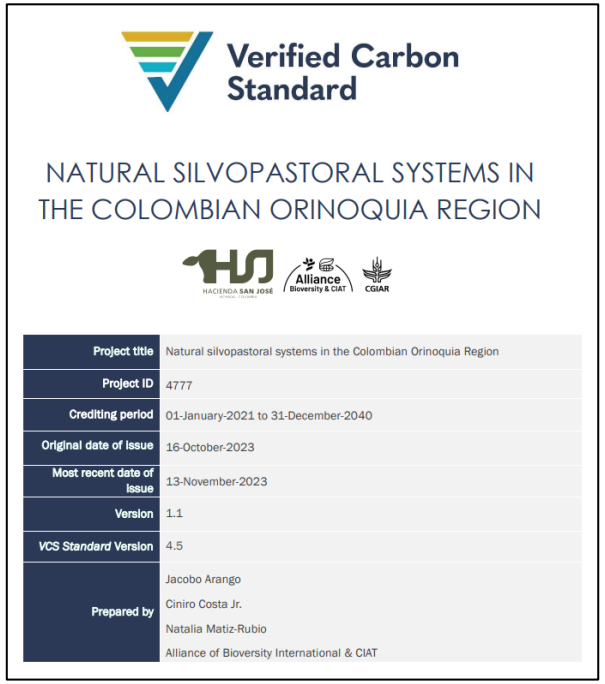
Presentation to GIZ

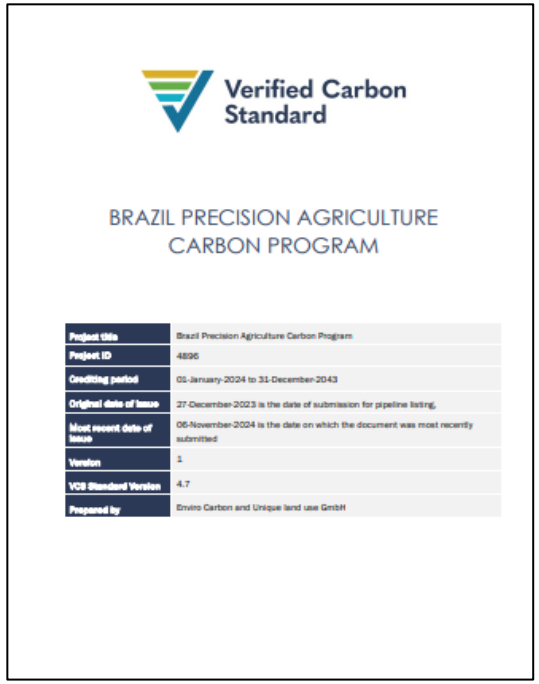
Cali, August 18th, 2025

Alliance Bioversity International and CIAT recent work with VCM



FAO, 2025





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Sumitomo Corporation

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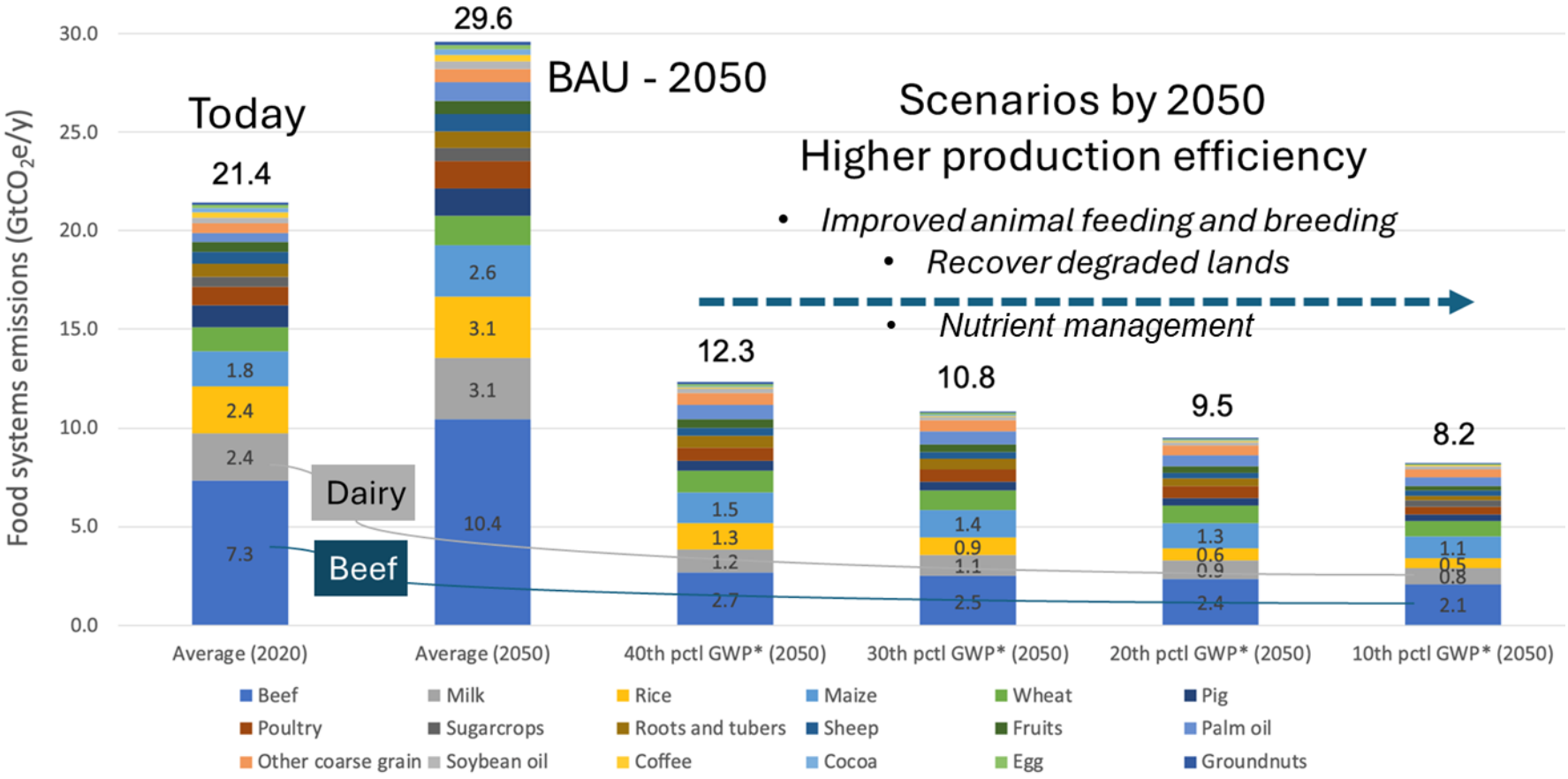
Livestock has the highest mitigation potential with the implementation of best practices (~7 Billion tCO_2e) – essential to meet global targets



Costa Jr et al., 2022

Beef in LATAM: Pasture-based intensification **could cut 50% of today's emissions** by 2050 while **increasing beef production in by 40%**

Extensive production
(56 tCO2e/t beef)

Today: 40 tCO2e / t beef

Improved production
(15 tCO2e/t beef)

Beef demand (Latam)

+40%

by 2050

FAO (2018)

Today = 640 $MtCO_2e$
(16 Mt beef)

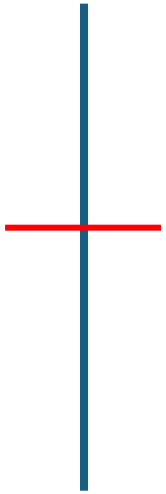
BAU 2050 = 880 $MtCO_2e$
(22 Mt beef)

Pasture-based intensification
- 50% emissions by 2050
(330 MtCO2e)

Costa Jr et al., 2025 in public.

Milk in Africa: Forage-based intensification **could cut 20% of today's emissions** while **increasing milk production by 140%**

Extensive production
(~5.0 tCO2e/ t Milk)



Today: ~7.9 tCO2e / t milk
(FAOSTAT)

Improved production
(~2.5 tCO2e/ t Milk)

Milk demand (SSA)

+140%

by 2050

FAO (2018)

Today = 355 $MtCO_2e$
(44.2 Mt milk)

BAU 2050 = 900 $MtCO_2e$
(111.9 Mt milk)

Forage-based intensification
-20% emissions by 2050
(280 MtCO2e)

Quintero et al., submitted

Types of Carbon Markets: Voluntary and Compliance

Compliance markets

(regulated by law)

Tax ETS

Voluntary markets

(driven by corporate esponsibility)

Offset Insetting

~USD 100 Billion

USD 1-160 / carbon credit

World Bank, 2025

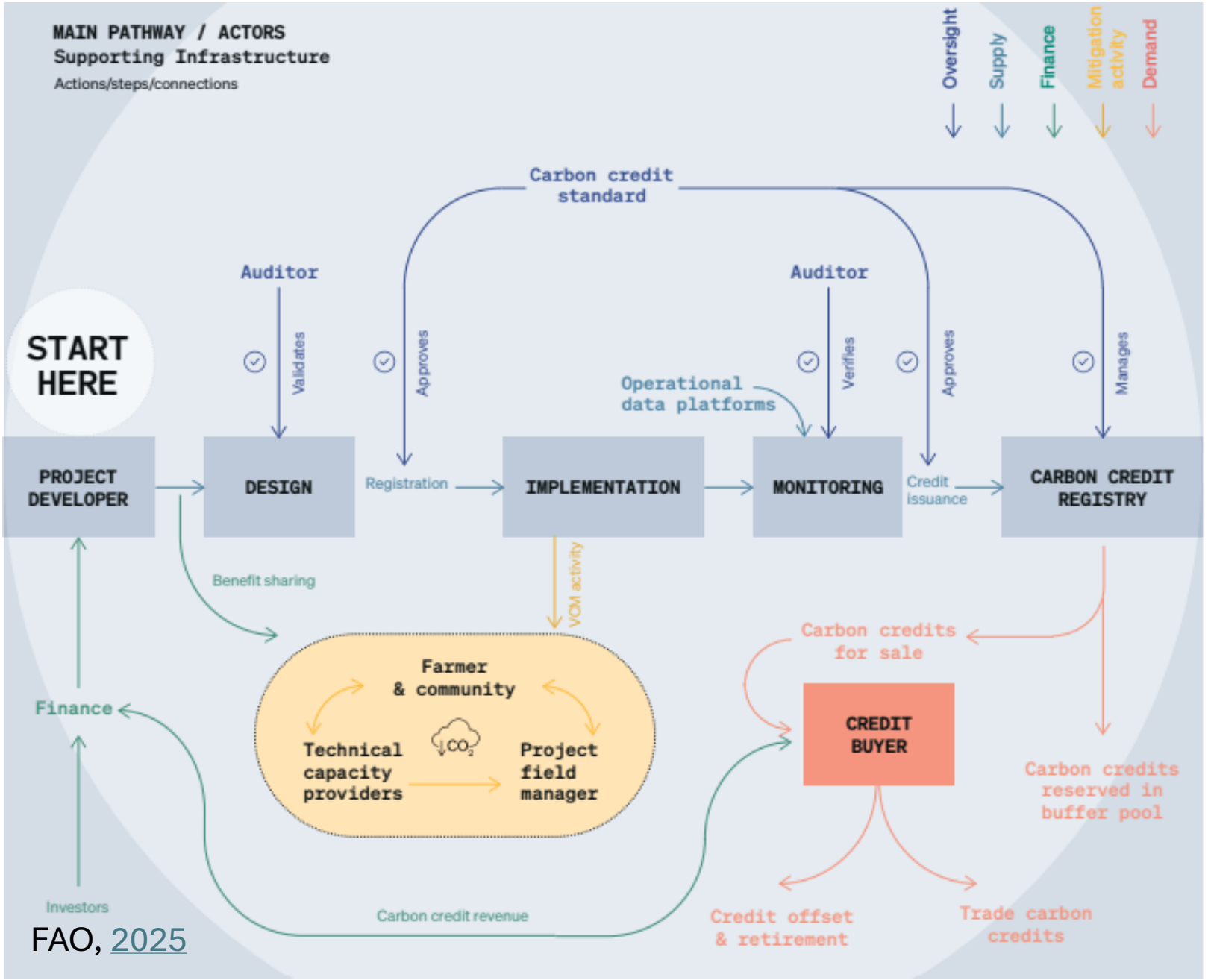
~USD 1-2 Billion

USD 6-8 / carbon credit (Ag)

ESMP, 2025

Carbon credits can be sold in voluntary markets or used to comply with regulations

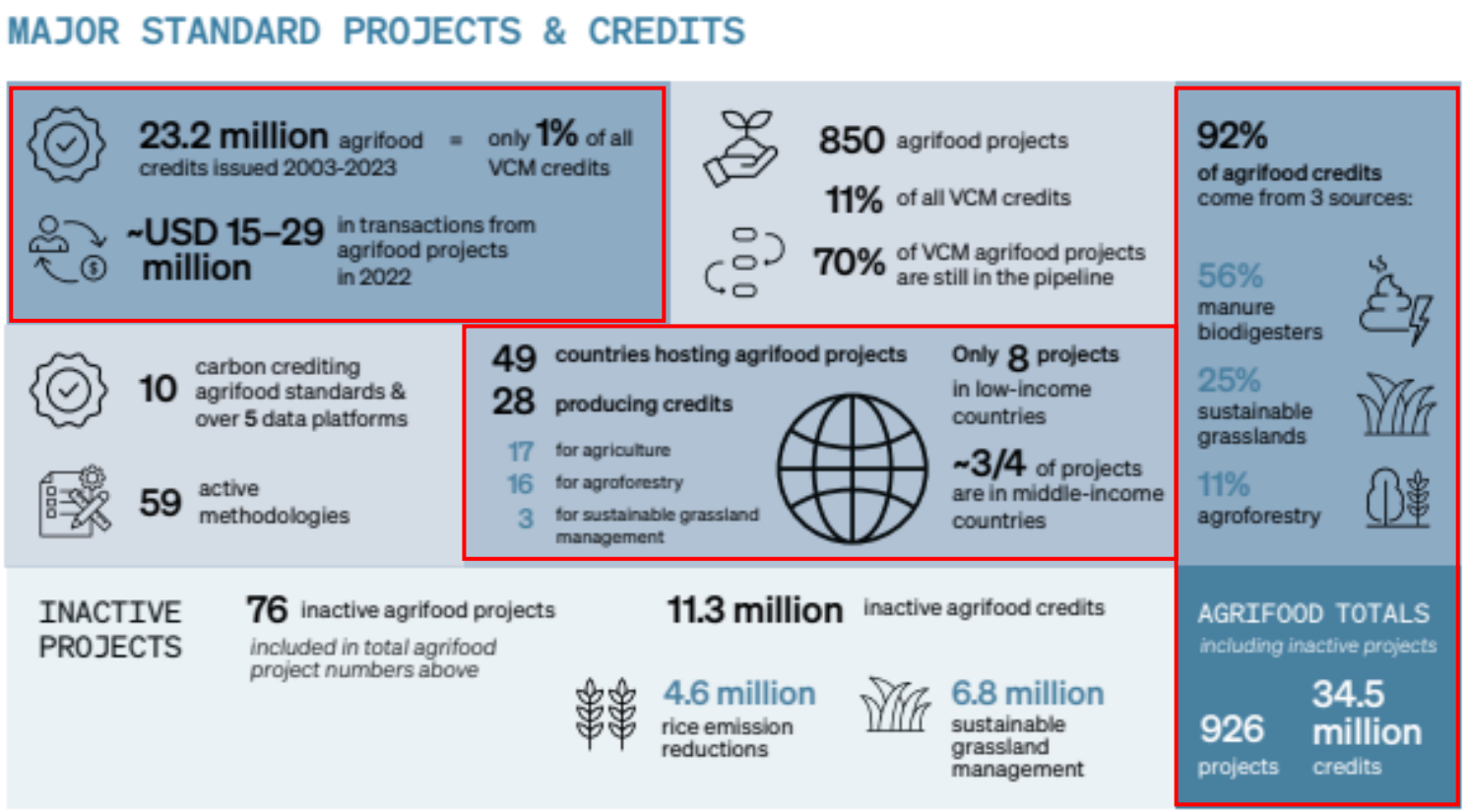
While the regulated market is larger, the voluntary market offers agriculture the agility to innovate and scale, preparing its entry into compliance systems.



FAO, 2025

VOLUNTARY CARBON CREDIT PRODUCTION

Scale of the agrifood sector in the VCM



FAO, 2025

Agrifood C- projects span 49 countries, but **75% are in China, India, and the U.S.** **68%** are in **upper middle-income countries**, revealing a clear equity gap.

Strong concentration—and untapped potential—for other agrifood mitigation pathways.

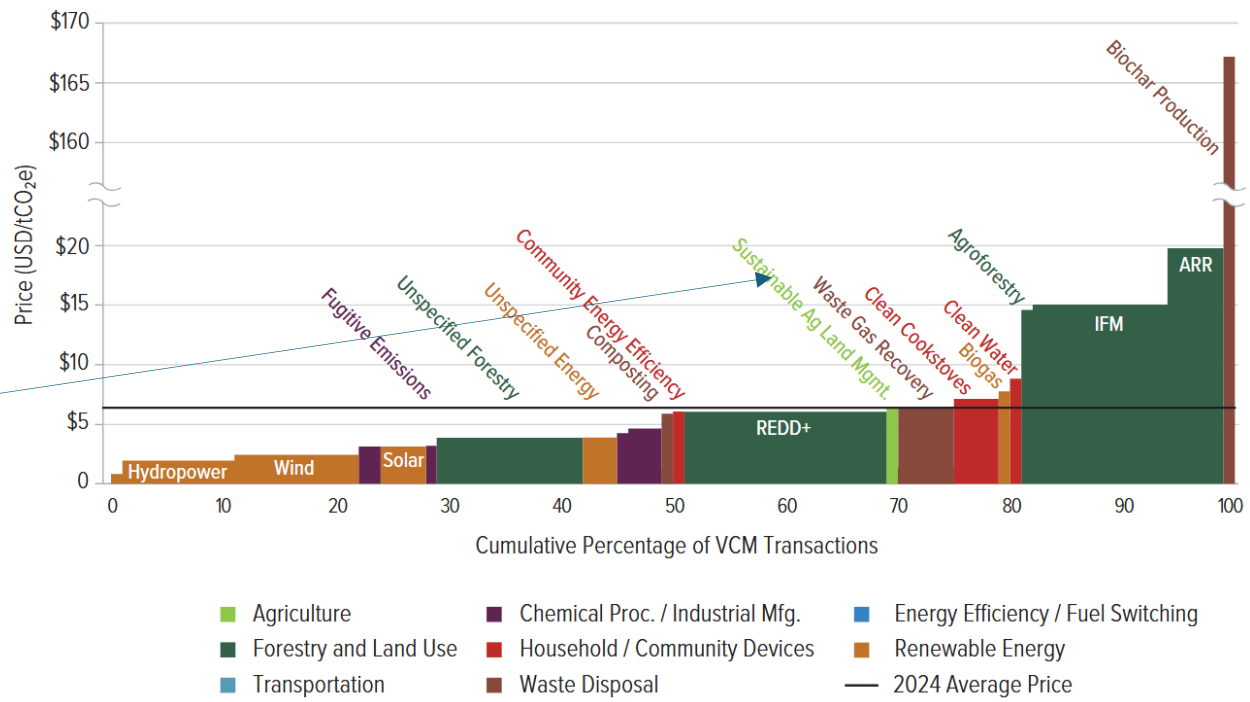
VCM Transaction prices (USD/CO2e)

Table 3. VCM Transaction Volumes, Values, and Prices by Project Category, 2023-2024

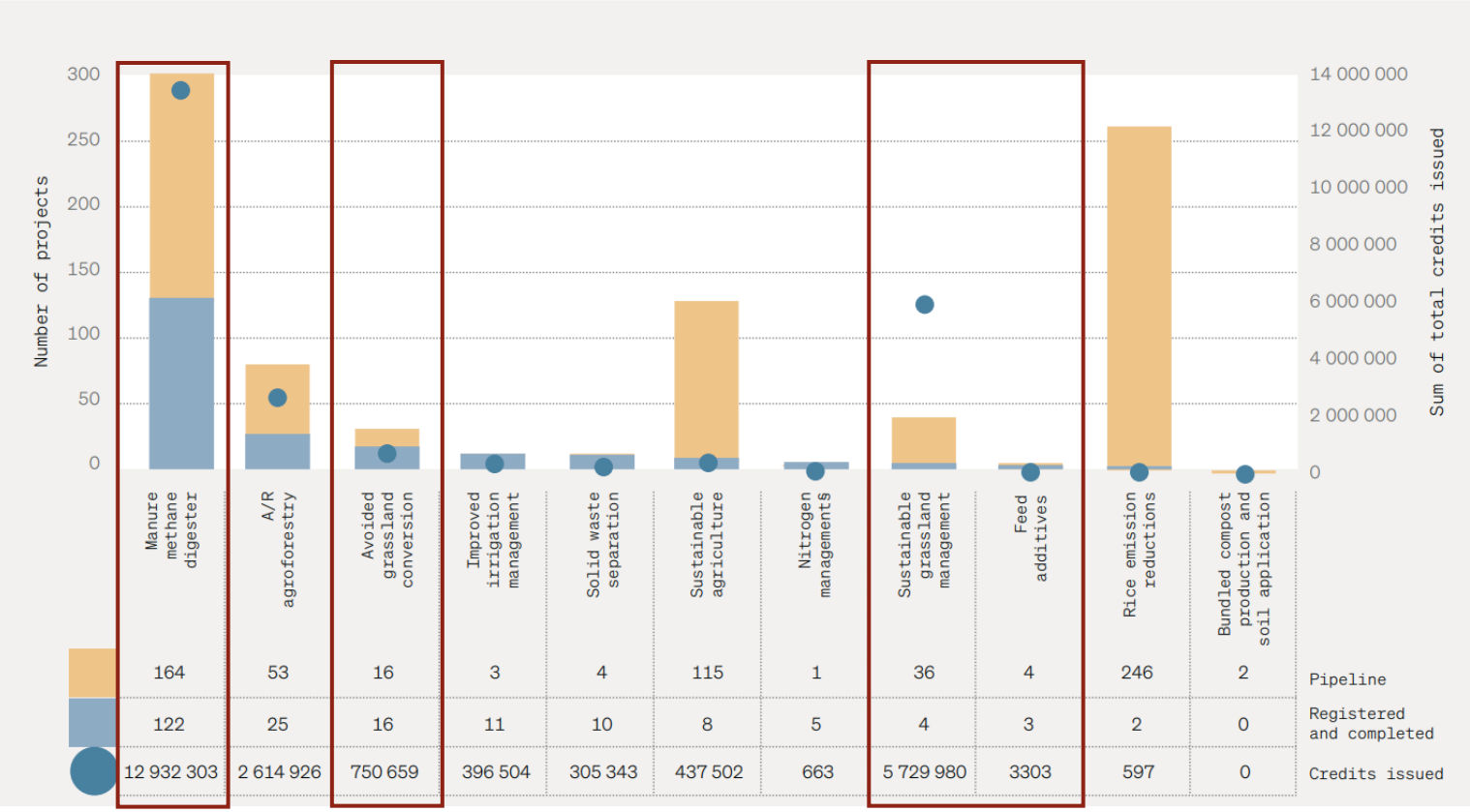
	2023			2024		
CATEGORY	Volume ($MtCO_2e$)	Value (USD)	Price (USD)	Volume ($MtCO_2e$)	Value (USD)	Price (USD)
Forestry and Land Use	37.1	$372.3M	10.04	37.0	$342.5M	9.27
Renewable Energy	29.0	$113.5M	3.92	22.3	$59.5M	2.67
Chemical Processes / Industrial Manufacturing	12.2	$50.2M	4.10	5.7	$20.8M	3.66
Household / Community Devices	10.2	$78.3M	7.71	5.1	$37.4M	7.30
Waste Disposal	1.5	$10.9M	7.46	4.8	$32.0M	6.72
Agriculture	4.7	$30.7M	6.51	0.6	$4.7M	7.66
Energy Efficiency / Fuel Switching	9.4	$34.4M	3.65	0.6	$1.9M	3.05
Transportation	-	-	-	0.2	$0.6M	3.24

Ecosystem Marketplace - Making the Priceless Valuable

Figure 7. VCM Credit Cost Curve, 2024 Transactions



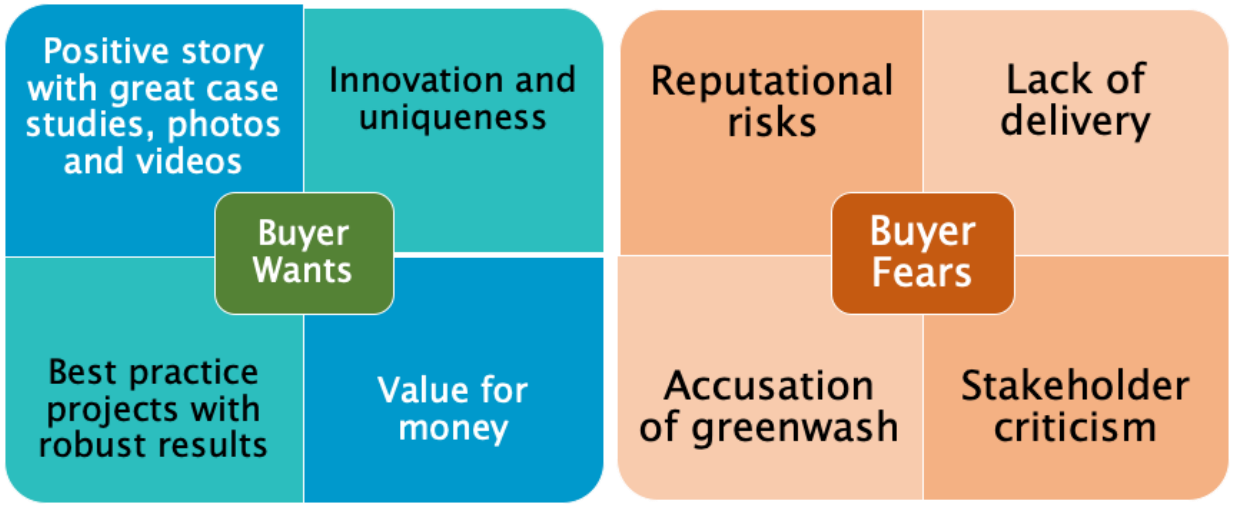
Global Carbon Project Landscape in VCM



Although many carbon projects in livestock are emerging — especially in manure management and feed improvements — they remains underrepresented and holds significant untapped potential.

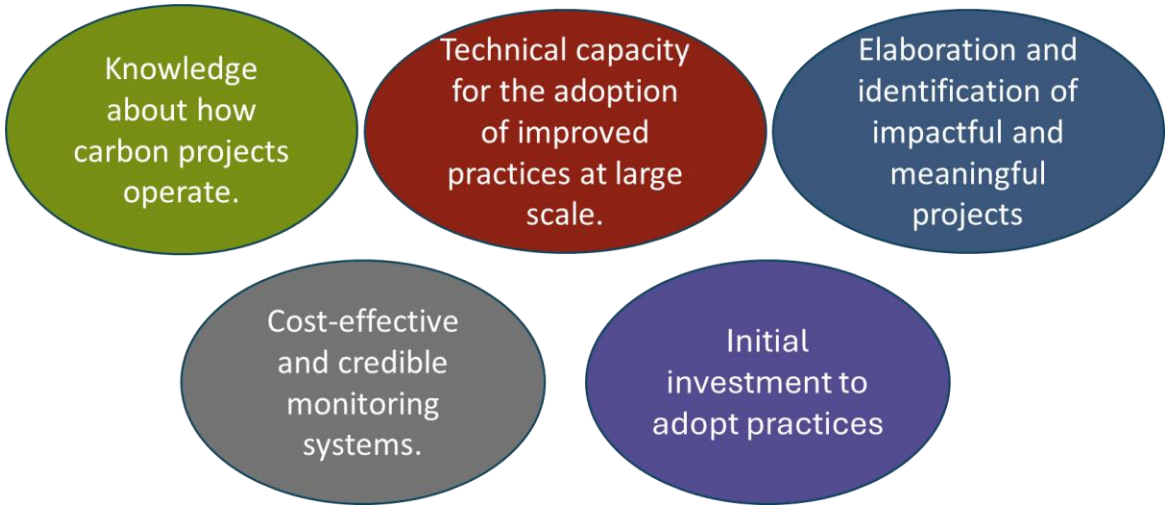
FAO, 2025

Attracting investors to carbon projects requires scale, compelling narratives, and the mitigation of reputational risks.



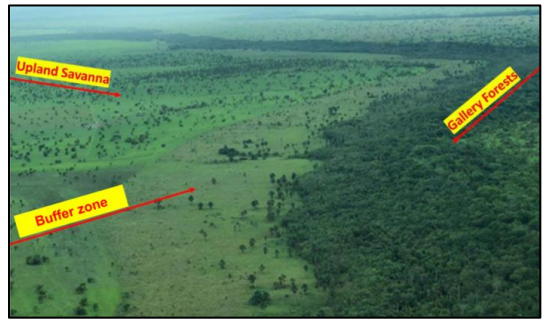
Slide courtesy: Sinha Chandra – The World Bank

Five actions to increase the number of carbon projects in the agriculture sector



Hacienda San José developed a leading model for low-emission livestock, combining climate-smart practices, carbon sequestration, and socio-economic co-benefits.

Colombia's new agricultural frontier



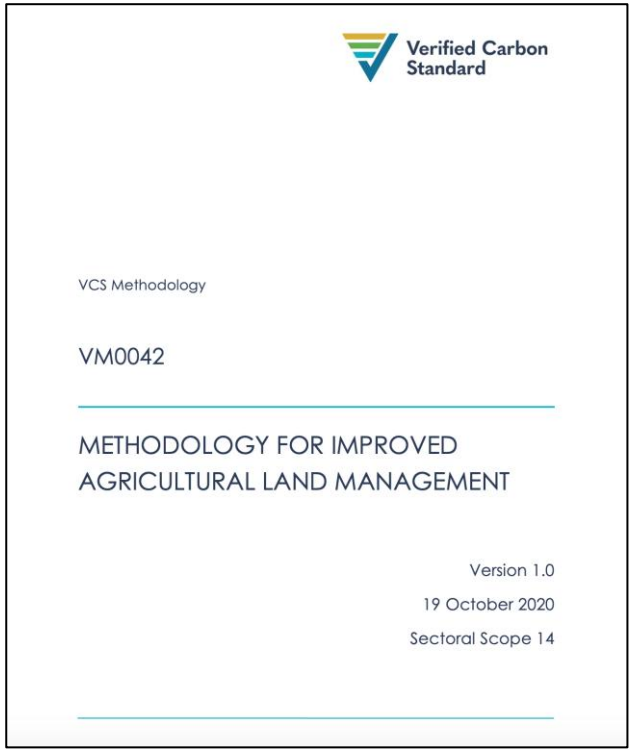
Project activities	1) Cease grassland burns 2) Human-assisted regeneration of *Curatella americana* on paddocks	3.A) Introduction of *Urochloa humidicola* CIAT 679 cv. Tully	3.B) Cattle enter the paddocks under adaptive multi-paddock grazing
Emission reductions and removals	Avoided CH_4 and N_2O emissions, carbon stock increase in woody biomass	Carbon stock increase in soil (main carbon pool)	
Complementary activities	Conservation of riparian forest Natural regeneration in buffer zones and environmental corridors	Introduction of *Eucalyptus pellita* as live fences	Introduction of high-quality cattle genetics of the breed short-cycle Nelore

Initial 8,000 ha with an expansion plan of 150,000 ha

17 ha / 1 cow

1 ha / cow

CIAT interventions can yield ~4.5 carbon credits $ha^{-1}y^{-1}$ and generate 1.0 Mi carbon credits per year over 200,000 ha in voluntary carbon markets.



Verified Carbon Standard

VCS Methodology

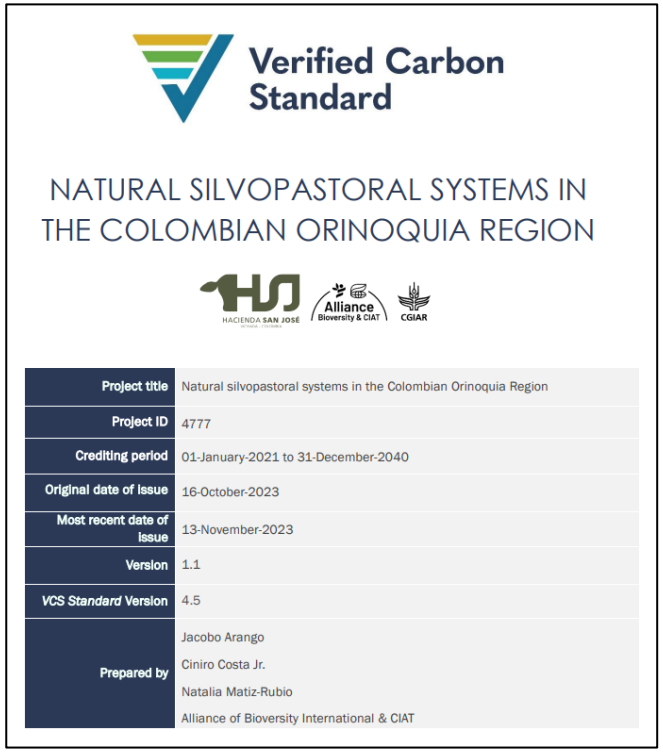
VM0042

METHODOLOGY FOR IMPROVED AGRICULTURAL LAND MANAGEMENT

Version 1.0

19 October 2020

Sectoral Scope 14



Verified Carbon Standard

NATURAL SILVOPASTORAL SYSTEMS IN THE COLOMBIAN ORINOQUIA REGION

Project title	Natural silvopastoral systems in the Colombian Orinoquia Region
Project ID	4777
Crediting period	01-January-2021 to 31-December-2040
Original date of issue	16-October-2023
Most recent date of issue	13-November-2023
Version	1.1
VCS Standard Version	4.5
Prepared by	Jacobo Arango Ciniro Costa Jr. Natalia Matiz-Rubio Alliance of Bioversity International & CIAT

EMISSION SOURCE	Emissions baseline (tCO_2e/year)	Emissions project (tCO_2e/year)	Net carbon benefits (tCO_2e/year)
Soil organic carbon	0	-50,442	50,442
Fossil fuels	0	20	-20
Soil Methanogenesis	0	0	0
Enteric fermentation	688	11,703	-11,015
Manure deposition	79	1,337	-1,258
Use of nitrogen fertilizers	0	28	-28
Use of N-fixing species	0	0	0
Biomass burning	1,908	0	-1,908
Woody biomass	0	- 406	406
TOTAL (~7,000 ha)	**2,675**	**-37,760**	**40,435**
C-Credits / ha / y (tCO2e/ha/y) (Buffer 20%)			**4.62**
C-Credits - Scaling phase 180,000 ha (MtCO2e/y) (Buffer 20%)			**0.83**

Project ID	Standard/Program	Project Name	Project Status	Date/Time of Status Change
4777	Verified Carbon Standard	NATURAL SILVOPASTORAL SYSTEMS IN THE COLOMBIAN ORINOQUIA REGION	Pipeline Listing (under development) approved	29/11/2023 01:40:10 PM

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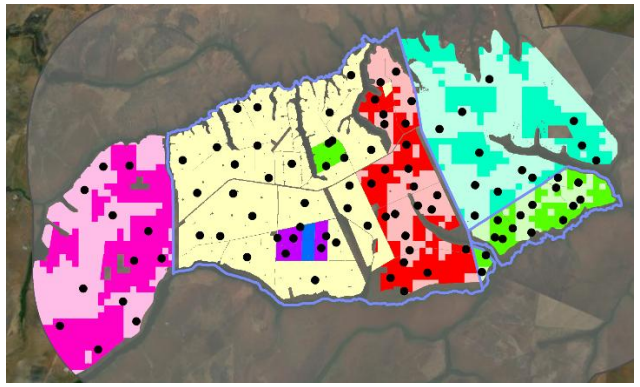
Cost-effective MRV based on simple tools and remote sensing



Land stratification

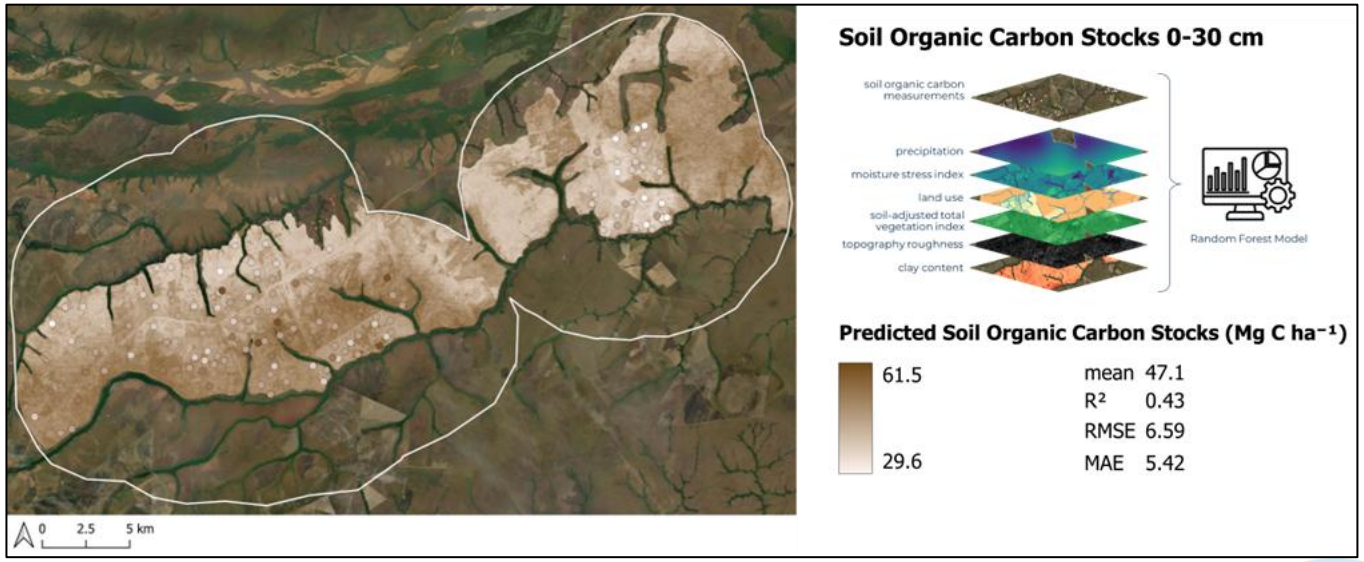
Direct soil carbon measurements

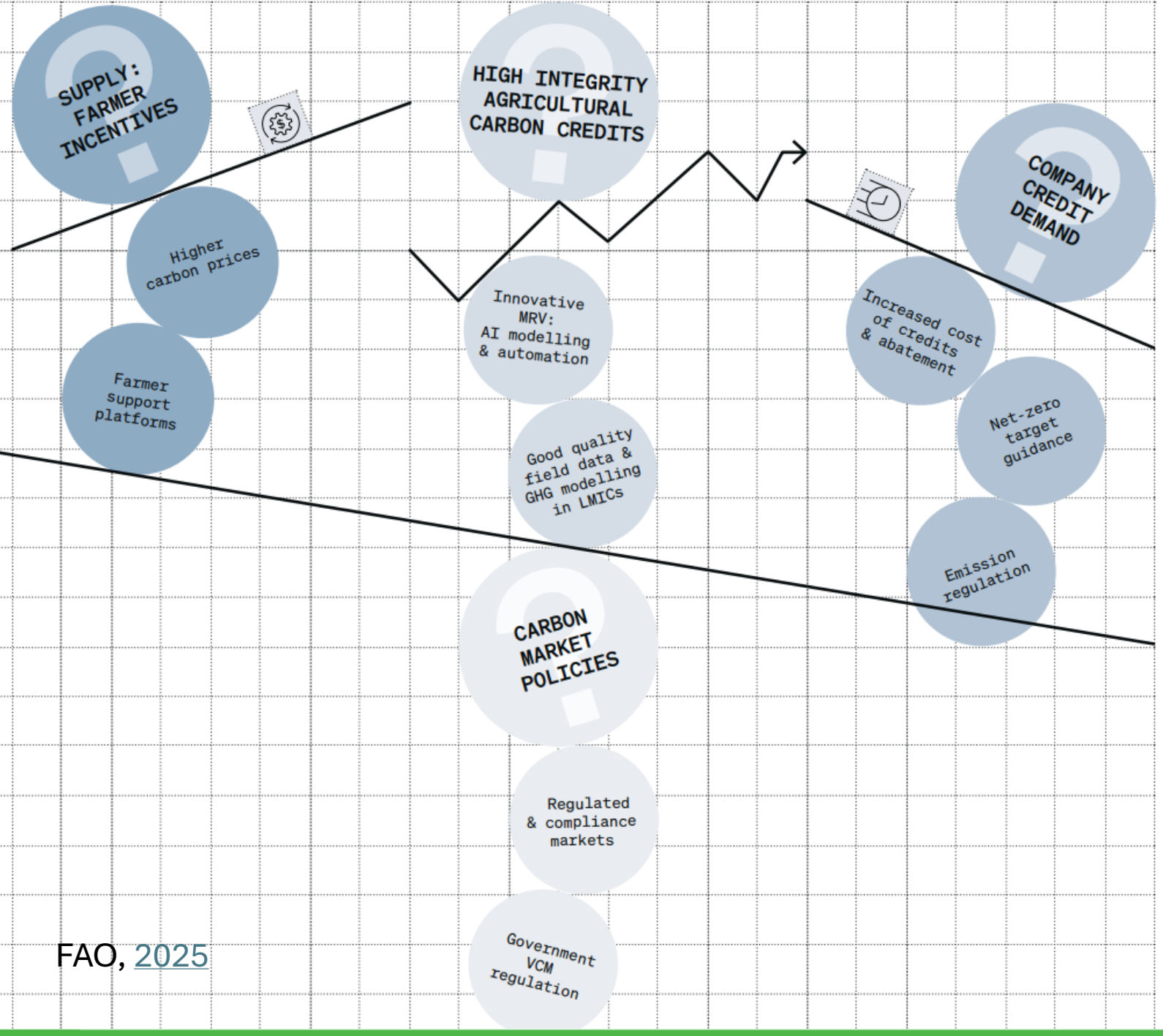
Rodriguez et al., 2025

MRV designed and led by CIAT:

- Low-cost soil probe + soil lab analysis
- Remote sensing to scale SOC monitoring

Remote sensing modeling





FAO, 2025

At least four major uncertainties will determine the future of the VCM: carbon market policies, companies' demand for credits, incentives to farmers and project developers and carbon credit integrity

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Thank you!

c.costajr@cgiar.org

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