

Ambio

Electronic Supplementary Material

This supplementary material has not been peer reviewed.

Title: **Partnering with cattle ranchers for large-scale restoration**

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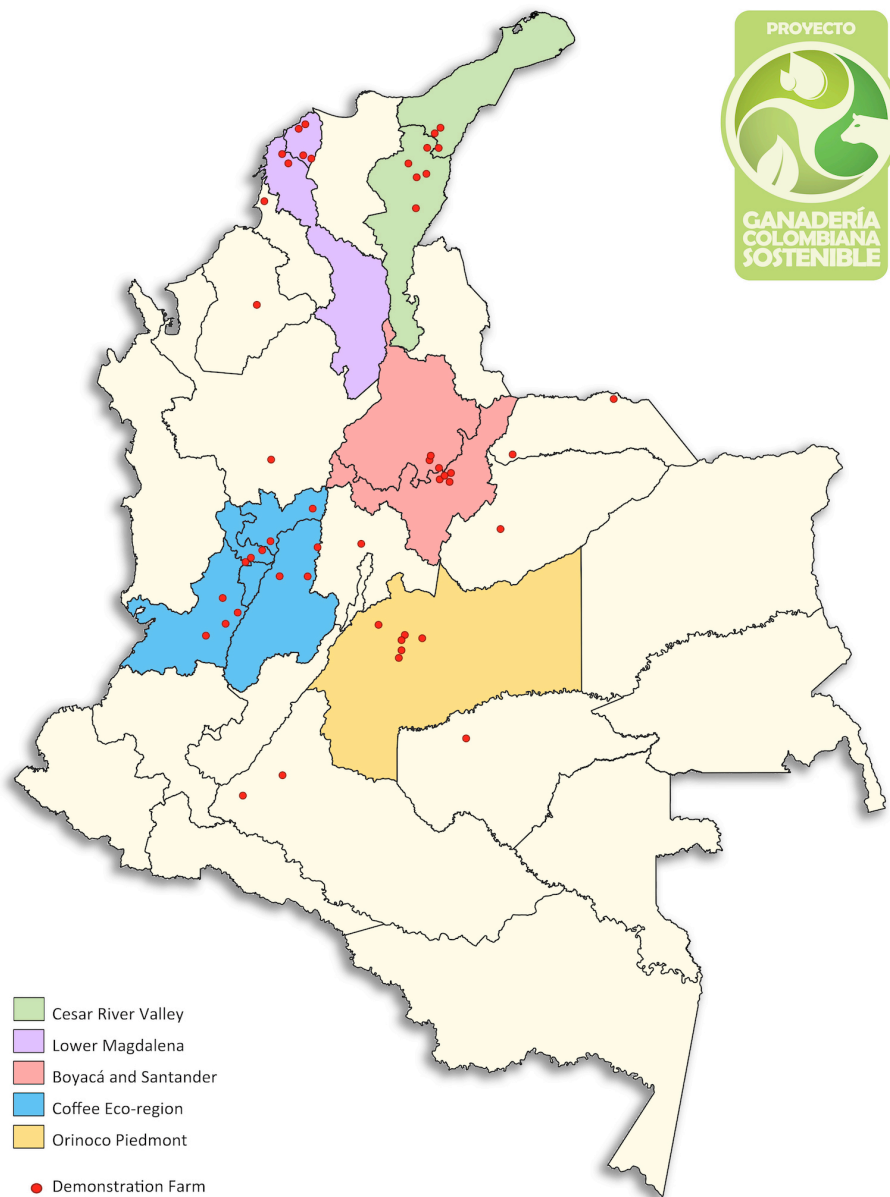


Figure S1.

MSCR project sites and demonstration farms. MSCR currently reaches 2900+ cattle ranchers and spans 87 municipalities in 12 states across five ecologically diverse regions of Colombia. A network of 50 silvopastoral demonstration farms (red dots) has been established to facilitate the diffusion and adoption of silvopastoral systems nationwide.

Table S1.

Characteristics of the ranchers and the farms represented in the rancher and extension agent surveys (n = 90 ranchers, 101 extension agents). Extension agents' numbers refer to the number of ranchers they serve. For (c), extension agents provided an estimates break-up of the farms they serve as small, medium or large, but the definition of these categories varies by region; for example, a 20-hectare farm is considered large in Boyacá but small in the Caribbean region.

	Ranchers	Extension agents	
a. Region			
Orinoco piedmont	53%	19%	
Amazon piedmont	16%	2%	
Boyacá-Santander	13%	21%	
Coffee Ecoregion-Andes	12%	22%	
Caribbean	6%	33%	
Other	0%	4%	
b. Ranchers' age and gender			
Under 40: 40-60: Over 60	24%: 49%: 27%	14%: 67%: 19%	
Male: Female	72: 28%	25: 25%	
c. Farm size in hectares (mean = 48.7, median = 20)			
1-10	20%	Small: 61%	
11-50	54%	Medium: 32%	
51-100	15%	Large: 7%	
≥ 100	11%		
d. Productive activities on the farm			
Cattle: 100%	Crops: 43%	Other: 21%	
e. Years of experience with silvopastoral systems			
Less than 2: 33%	2-5: 52%	6-10: 7%	10 or more: 8%

Table S2.

χ^2 test values comparing ranchers' and extension agents' perceptions on motivations for the adoption of conservation practices.

Motivations	χ^2	P
a. For the adoption of silvopastoral practices		
Improve productivity	0.046	0.830
Protect the environment	2.551	0.110
Access technical assistance	2.731	0.098
Recover soil fertility	9.363	0.002*
Increase profitability	2.327	0.127
Produce more sustainably	3.303	0.069
Bequeath better farm to heirs	5.135	0.023*
Reduce input costs	0.065	0.799
Inspired by demonstration farm	1.838	0.175
PES or monetary incentive	46.880	0.000*
b. For planting trees in pastures, corridors, live fences		
Shade for animal comfort	2.128	0.145
Improve fodder quality/quantity	0.452	0.501
Protect the environment	1.087	0.297
Attract beneficial organisms	13.087	0.000*
Protect or improve soils	0.172	0.678
Improve farm aesthetics	0.191	0.662
Firewood, timber, fruit, etc.	0.486	0.485
Protect water sources	2.568	0.109
c. For protecting forests		
Conserve wildlife	16.375	0.000*
Protect water quality/quantity	1.806	0.179
Protect the environment	0.529	0.467
PES or monetary incentive	22.809	0.000*
Avoid penalties	0.413	0.520
d. For protecting riparian forests		
Protect water quantity	0.006	0.938
Protect water quality	0.024	0.877
Protect the environment	1.292	0.256
Conserve wildlife	4.887	0.027*
Improve farm aesthetics	1.429	0.232
Prevent soil erosion	1.194	0.275
Connect forest fragments	0.431	0.511
PES or monetary incentive	31.544	0.000*

* Significant differences between ranchers and extension agents (χ^2 , $P < 0.05$)

Table S3.

Ranchers' assessment of value statements related to the environment (n = 67-87 ranchers, 92-97 extension agents). For extension agents, numbers indicate estimated percent of their ranchers who they think would agree with the statement.

Value statements	Ranchers		
	Agree	Neutral	Disagree
As a farmer, environmental protection is my responsibility	100%	0%	0%
The farm is more valuable with protected streams/forests	95%	2%	2%
Without payment, I see no reason to protect the environment	1%	2%	96%
Environmental protection has high costs but few benefits	18%	13%	69%
If I want more production I cannot worry about the environment	15%	15%	71%
The land produces more when the environment is conserved	97%	2%	0%
Trees provide direct benefits for production	100%	0%	0%
The farm looks better with more trees	97%	2%	1%
Sustainable farm management reflects on better animal health	99%	1%	0%
One can produce cattle without damaging the environment	87%	8%	5%
As a farmer, I have no control over soil degradation	15%	1%	84%
Excessive use of agrochemicals can harm the environment	95%	1%	4%
I feel proud of my peasant heritage	96%	4%	0%
I feel a strong emotional tie to my land	89%	9%	1%
Sustainable farm management fits our family project	93%	6%	1%
I worry about generational relay on my farm	47%	22%	31%
I take care of my land for the enjoyment of future generations	98%	1%	1%
I do not plant trees because I will not be here to harvest them	2%	2%	95%
I make decisions about the farm thinking long-term	90%	7%	3%

Value statements	Extension agents		
	> 50%	~ 50%	< 50%
I want to reduce my farm's environmental impact	79%	18%	4%
My farm has more value when it has protected streams/forests	83%	96%	7%
If I protect the environment, I should receive a payment	80%	8%	12%
Environmental protection has high costs but few benefits	27%	17%	55%
If I want to produce more I cannot worry about the environment	24%	27%	50%
Land produces more when the environment is conserved	80%	15%	5%
Trees provide direct benefits for production	91%	8%	1%
The farm looks better with more trees	89%	7%	4%
I understand the environmental impact of cattle production	78%	16%	6%
As a farmer, I have no control over soil degradation	33%	25%	42%
I want to reduce use of agrochemicals	71%	21%	8%
I feel a strong emotional tie to my land	87%	12%	2%
I worry about generational relay on my farm	64%	19%	19%
I don't plant trees because I won't be here to harvest them	11%	14%	76%
I make decisions about the farm thinking long-term	62%	23%	15%

Table S4. χ^2 test values comparing ranchers' and extension agents' perceptions on barriers and incentives for the adoption of conservation practices.

	χ^2	P
Incentives for the adoption of conservation practices		
High input costs	0.114	0.735
Labor shortage	4.152	0.042*
Maintenance requirement	1.830	0.176
High tree mortality rate	3.435	0.064
Lack of technical assistance	1.029	0.310
Interference with pastures	2.857	0.091
Fear of fines or permits	14.244	0.000*
Barriers for the adoption of conservation practices		
In-kind donations	0.119	0.730
Tree maintenance after planting	5.666	0.017*
Property tax breaks	0.000	0.996
PES or monetary incentive	24.379	0.000*
Continued technical assistance	0.208	0.649
Fence maintenance after planting	9.388	0.002*
Premium market prices	1.605	0.205

* Significant differences between ranchers and extension agents (χ^2 , $P < 0.05$)

Appendix 1.
Survey questions

**Environmental Protection in Cattle Farms
Cattle Rancher Survey**

Instructions:

Please answer the questions according to **your own experience**. If there is a question you do not want to answer, leave it blank. Your answers are confidential and anonymous, and will be used only for research purposes.

Section A.

Rancher and farm information

- A1.** Farm location (municipality and state): _____
- A2.** Farm size (approximate): _____ hectares
- A3.** Productive activities practiced on the farm
 Cattle ranching Agriculture Agro-tourism Other _____
- A4.** Your relation to the farm: Owner Administrator Heir
- A5.** Farm origin:
 Acquired by current owner Family property from previous generations
- A6.** Age: < 30 30-39 40-49 50-59 > 60
- A7.** Gender: Female Male

Section B.

Sustainable productive systems

- B1.** Your farm is:
 Ganadería Colombiana Sostenible Project farm Demonstration farm
 None of the above
- B2.** How long since you started implementing sustainable ranching practices? _____
- B3.** What were your/your family's **motivations** to take interest in the adoption of sustainable ranching practices? (*Check all that apply*)
- | | |
|--|---|
| <input type="checkbox"/> Improve productivity | <input type="checkbox"/> Access to technical assistance |
| <input type="checkbox"/> Reduce cost of input purchase | <input type="checkbox"/> Produce in a more sustainable way |
| <input type="checkbox"/> Improve profitability of the system | <input type="checkbox"/> Improve food security |
| <input type="checkbox"/> Recover soil fertility | <input type="checkbox"/> Leave a better farm for my heirs |
| <input type="checkbox"/> Recover the micro-catchment | <input type="checkbox"/> Visited a demonstration farm |
| <input type="checkbox"/> Receive an economic incentive | <input type="checkbox"/> Protect or improve the environment |
- Other: _____

B4. Which of the following systems **have you implemented** on your farm to date?

- Live fences
 Pasture division for rotation
 Fodder bank
 Scattered trees in pastures
 Fodder hedgerow
 Intensive silvopastoral system

Other: _____

B5. Which of the following has changed in your farm after implementing the systems?

Change	Increase	Decrease	No change
Use of external inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cattle health or body condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fodder and pasture quality or quantity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Production stability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Presence or birds or wildlife	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B6. How satisfied are you with the **results** obtained to date?

- Very satisfied
 Satisfied
 Neutral
 Unsatisfied
 Very unsatisfied

Section C.

Environmental protection actions

C1. Has your farm previously participated in **another program or project** focused on the following issues? *(Check all that apply)*

- Fencing and protection of micro-catchment
 Native or timber-tree planting
 Riparian corridor reforestation
 Rehabilitation of eroded areas
 Forest protection

C2. Which of the following **exist** on your farm today?

- Spring, stream or wetland
 Riparian corridor
 Forest fragment
 Landslide or eroded area

C3. Are you **currently** doing any of the following on your farm?

Action	Yes	No	No but I'd like to	Not apply
Protecting or recovering a forest fragment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protecting or reforesting a riparian corridor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Planting trees in pastures, corridors or live fences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Restricting cattle access to water sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protecting and managing natural regeneration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing use of agrochemical inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C4. If you are **protecting or recovering forest fragments**, what are your motivations? *(Check all that apply)*

- | | |
|---|---|
| <input type="checkbox"/> Protect water quality /quantity | <input type="checkbox"/> Receive and economic incentive |
| <input type="checkbox"/> Conserve plants and wild animals | <input type="checkbox"/> Improve touristic amenities |
| <input type="checkbox"/> Protect the environment | <input type="checkbox"/> Avoid penalty fees |

Other: _____

C5. If you are **protecting o reforesting riparian corridors**, what are your motivations? *(Check all that apply)*

- | | |
|---|--|
| <input type="checkbox"/> Protect or recover water quantity | <input type="checkbox"/> Receive payment for conservation |
| <input type="checkbox"/> Protect water quality | <input type="checkbox"/> Protect forest plants and animals |
| <input type="checkbox"/> Prevent soil erosion | <input type="checkbox"/> Connect forest fragments |
| <input type="checkbox"/> Beautify the farm | <input type="checkbox"/> Protect the environment |

Other: _____

C6. If you are **planting trees** in pastures, corridors or live fences, what are your motivations? *(Check all that apply)*

- | | |
|---|--|
| <input type="checkbox"/> Provide shade to improve animal welfare | <input type="checkbox"/> Protect water sources |
| <input type="checkbox"/> Improve fodder quality/quantity | <input type="checkbox"/> Protect o improve the soils |
| <input type="checkbox"/> Harvest fruit, firewood, timber, others | <input type="checkbox"/> Beautify the farm |
| <input type="checkbox"/> Attract beneficial insects, birds or animals | <input type="checkbox"/> Protect the environment |

Other: _____

C7. If you are planting or planning to plant trees, what **type of trees** do you prefer? *(Check all that apply)*

- | | |
|---|---|
| <input type="checkbox"/> Fast growing trees | <input type="checkbox"/> Trees with beautiful flowers |
| <input type="checkbox"/> Fruit trees | <input type="checkbox"/> Nitrogen fixing trees |
| <input type="checkbox"/> Timber trees | <input type="checkbox"/> Shade trees |
| <input type="checkbox"/> Native trees | <input type="checkbox"/> Trees that attract wildlife |

Other: _____

C8. What are the main factors **preventing** you from implementing more environmental protection actions on your farm? *(Check all that apply)*

- | | |
|--|---|
| <input type="checkbox"/> High cost of inputs (trees, wire, etc.) | <input type="checkbox"/> Interference with production |
| <input type="checkbox"/> High maintenance requirements | <input type="checkbox"/> Lack of knowledge or information |
| <input type="checkbox"/> High tree mortality | <input type="checkbox"/> Lack of technical assistance |
| <input type="checkbox"/> Labor shortages | <input type="checkbox"/> Not important to me |

Other: _____

C9. Which of the following **incentives** would motivate you to implement more environmental protection actions on your farm?

- In-kind donations (trees, wire, fertilizer, labor, etc)
- Payments for ecosystem services (water, carbon, biodiversity, etc)
- Help with tree maintenance after planting
- Help with fence maintenance once installed
- More technical assistance
- Better market prices for sustainable production
- Tax breaks

Other: _____

C10. For each of the following statements, indicate your level of **agreement or disagreement**:

1 = agree **2** = neither agree nor disagree **3** = disagree

	Agreement		
	1	2	3
The farm looks more beautiful with more trees	1	2	3
I want to take care of my land for the enjoyment of future generations	1	2	3
If I want to produce more, I cannot worry about protecting the environment	1	2	3
I feel a deep emotional connection to my land	1	2	3
As a farmer I cannot prevent the deterioration of the soils	1	2	3
Trees generate direct benefits for production	1	2	3
Sustainable management is reflected in the bodily condition of the animals	1	2	3
Protecting the environment generates many costs and few benefits	1	2	3
The farm is worth more if the streams and forests are protected	1	2	3
I don't plant trees because I won't be here to harvest them	1	2	3
Using agrochemical inputs can harm the environment	1	2	3
It is my responsibility as a farmer to protect the environment	1	2	3
Sustainable management of the farm is part of the family project	1	2	3
The land produces more when the environment is protected	1	2	3
I feel proud of my rural heritage	1	2	3
If I am not paid, I do not see a reason to protect the environment	1	2	3
Cattle ranching can be done without a negative impact on the environment	1	2	3
I think long-term when making decisions about the farm	1	2	3
I am worried about generational relay in my farm	1	2	3

Section D.

Climate change

D1. Have you perceived **changes in the weather** of your region in recent years?

- Yes No (If you replied **No**, go to Section E)

D2. If you replied Yes, **what kind of changes** have you perceived? (Check all that apply)

- Higher than normal temperatures Lower than normal temperatures
 Shorter than normal rainy season Longer than normal rainy season
 Shorter than normal dry season Longer than normal dry season
 More intense or torrential rains More severe droughts
 Increasingly unpredictable weather

Other: _____

D3. What type of **effect** do you think these changes will have on your productive activity?

- Very positive Somewhat positive Neutral Somewhat negative Very negative

D4. Do you believe the changes you are implementing can help you **face the effects** of these changes in weather? *Explain*

Section E.

Technical assistance and capacity building

E1. Have you received any type of technical assistance and/or capacity building to implement these changes on your farm?

- Yes, by the Proyecto Ganadería Colombiana Sostenible
 Yes, by another cattle ranching project
 Yes, by CIPAV
 Yes, by another organization
 I have not received technical assistance or capacity building (If your answer is **No**, end here)

E2. How much **technical assistance and information** have you received on the following topics?

Topic	Much	Some	Very little	None
Productive systems (pastures, hedges, intensive)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Animal health and management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Planting and maintenance of trees in pastures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Management of natural regeneration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Watershed protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental impact of cattle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E3. How much **importance** have your extension agents assigned to the following topics related to environmental protection?

Action	Much	Some	Very little	None
Protecting or recovering forest fragments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protecting or recovering riparian corridors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increasing tree cover on the landscape	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Planting native trees if possible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protecting or recovering the soil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protecting native plants and wildlife	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reducing the use of agrochemical inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E4. How often do you follow the **recommendations** provided by the extension agents who visit you?

- Always Frequently Sometimes Rarely

E5. How satisfied are you with the **quantity and quality** of technical assistance you have received?

- Very satisfied Satisfied Neutral Unsatisfied Very unsatisfied

Thanks for your time and participation!

If you have additional comments, please provide them here:

**Environmental Protection in Cattle Farms
Survey for Technical Staff in the Proyecto Ganadería Colombiana Sostenible**

Instructions:

Please answer the questions according to **your own experience**. If there is a question you do not want to answer, leave it blank. Your answers are confidential and anonymous, and will be used only for research purposes.

Section A.

Information about the extension agent

A1. Your current position in the Ganadería Colombiana Sostenible Project (or other project):

A2. Time working with the Project: _____

A3. Within the Project, you work for: FEDEGAN CIPAV

A4. Before this Project, did you have any experience working with sustainable cattle ranching?
 Yes No

A5. What is your technical or professional background? _____

A6. In one sentence, how would you explaining this Project to someone who knows nothing about it?

A7. Gender: Female Male

A8. Age: 20-29 30-39 40-49 Over 50

Section B.

State of the landscape in your work region

B1. Project region where you work: _____

B2. Municipalities of the farms assigned to you: _____

B3. Select the options that best describe the general landscape(s) where you work:

Land use: Pasture Cropland Pasture and cropland Other

Deforestation: Less than 40% 40–70% 70–100%

Erosion: Light Moderate Severe

- Forest fragments:** Many, large and conserved
 Many, medium sized and conserved
 Many, medium sized and disturbed
 Few, medium sized and disturbed
 Few, small and disturbed
 Almost none left
- Live fences and trees in pastures:** Very common Somewhat common Uncommon
- Connectivity:** High Intermediate Low

Section C.

Information about the ranchers

B1. Total number of farms or ranchers under your responsibility: _____

B2. Approximately **what percentage** of your ranchers are:

- Male: _____ % Female: _____ %
- Under 40 years: _____ % 40–60 years: _____ % Over 60 years: _____ %
- Small: _____ % Medium: _____ % Large: _____ %
- Subsistence farmers: _____ % Commercial farmers: _____ %
- *Campesino* farmers: _____ % City farmers: _____ %

B3. Approximately **what percentage** of your ranchers would you describe as:

- Very interested and actively engaging: _____ %
- Interested, but engaging less than they would like to: _____ %
- Somewhat interested, and only partly engaged: _____ %
- Not interested and not engaged: _____ %

B3. In your experience, what were the main **motivations** your ranchers had **to participate** in this Project? (*Check all that apply*)

- | | |
|--|--|
| <input type="checkbox"/> Improve farm productivity | <input type="checkbox"/> Improve the environment |
| <input type="checkbox"/> Improve profitability of the system | <input type="checkbox"/> Leave a better farm to their heirs |
| <input type="checkbox"/> Reduce cost of input purchase | <input type="checkbox"/> Receive an economic incentive |
| <input type="checkbox"/> Access to technical assistance | <input type="checkbox"/> Visited a demonstration farm |
| <input type="checkbox"/> Recover soil fertility | <input type="checkbox"/> Referred by friend or relative |
| <input type="checkbox"/> Produce in a more sustainable way | <input type="checkbox"/> Positive experience with a previous project |

Other: _____

B3. Which of these systems have the **highest acceptance** among your ranchers?

- | | |
|---|---|
| <input type="checkbox"/> Pasture division | <input type="checkbox"/> Live fences |
| <input type="checkbox"/> Fodder bank | <input type="checkbox"/> Scattered trees in pastures |
| <input type="checkbox"/> Fodder hedgerow | <input type="checkbox"/> Intensive silvopastoral system |

Section C.

Environmental protection

Answer the following questions considering **only** those ranchers who are in some way **actively interested** and/or engaged in the Project.

C1. What proportion of your ranchers do you think would be interested in or willing to implement the following environmental protection actions?

A = most **B** = more than half **C** = half **D** = less than half **E** = very few

Environmental protection action	Interested ranchers				
	A	B	C	D	E
Protect forest fragments	A	B	C	D	E
Protect or reforest riparian corridors	A	B	C	D	E
Plant trees in pastures and live fences	A	B	C	D	E
Reforest steep or severely eroded areas	A	B	C	D	E
Prevent cattle from direct access to water sources	A	B	C	D	E
Protect and manage natural regeneration	A	B	C	D	E
Reduce the use of agrochemical inputs	A	B	C	D	E

C2. In your experience, what are ranchers' main **motivations** to protect the forest fragments? *(Check all that apply)*

- Protect water quality and/or quantity Receive an economic incentive
- Conserve wild plants and animals Avoid penalty fees
- Protect the environment Have enough land

Other: _____

C3. In your experience, what are ranchers' main **motivations** to protect or reforest **riparian corridors**? *(Check all that apply)*

- Protect or recover water quantity Receive payment for conservation
- Protect water quality Conserve wild plants and animals
- Prevent soil erosion Connect forest fragments
- Beautify the farm Protect the environment

Other: _____

C4. In your experience, which are ranchers' main **motivations** to plant trees in pastures or live fences? *(Check all that apply)*

- Provide shade for animal welfare Improve fodder quality/quantity
- Harvest fruit, firewood, timber, other Attract beneficial insects, birds or animals
- Protect water sources Protect or improve the soils
- Beautify the farm Protect the environment

Other: _____

C5. In your experience, what **type of trees** do ranchers prefer? (*Check all that apply*)

- | | |
|---|---|
| <input type="checkbox"/> Fast growing trees | <input type="checkbox"/> Trees with beautiful flowers |
| <input type="checkbox"/> Fruit trees | <input type="checkbox"/> Nitrogen fixing trees |
| <input type="checkbox"/> Timber trees | <input type="checkbox"/> Shade trees |
| <input type="checkbox"/> Native trees | <input type="checkbox"/> Trees that attract wildlife |

Other: _____

C6. In your experience, what are the **main barriers** preventing ranchers from implementing more environmental protection actions? (*Check all that apply*)

- | | |
|--|--|
| <input type="checkbox"/> High cost of inputs (trees, wire, etc.) | <input type="checkbox"/> High maintenance requirements |
| <input type="checkbox"/> High mortality of planted trees | <input type="checkbox"/> Labor shortage |
| <input type="checkbox"/> Fear of reduced productivity | <input type="checkbox"/> Fear of restrictions for harvesting |
| <input type="checkbox"/> Lack of information or technical assistance | <input type="checkbox"/> Not considered important |

Other: _____

C7. In your experience, which **incentives** would most effectively motivate ranchers to implement more environmental protection actions? (*Pick maximum 3*)

- In-kind donations (trees, wire, fertilizer)
- Help with labor
- Help with tree maintenance after planting
- Help with fence maintenance once installed
- Payment for ecosystem services (water, carbon, biodiversity, etc.)
- Tax breaks
- Better market prices for sustainable production
- More technical assistance on specific topics
- None, they are not interested

Other: _____

C8. What proportion of your ranchers would you describe as...?

A = most **B** = more than half **C** = about half **D** = less than half **E** = very few

Ranchers who:	Proportion				
	A	B	C	D	E
Think the farm looks better with more trees	A	B	C	D	E
Work to leave the farm in better condition for their heirs	A	B	C	D	E
Think they cannot produce more and protect the environment	A	B	C	D	E
Think trees provide benefits for production	A	B	C	D	E
Feel strong emotional ties to their land	A	B	C	D	E
Think they have no control over soil degradation	A	B	C	D	E
Think environmental protection generates more costs than benefits	A	B	C	D	E
Think the farm is worth more with protected forests and streams	A	B	C	D	E

Don't plant trees because they won't be able to harvest them	A	B	C	D	E
Want to use agrochemical inputs more responsibly	A	B	C	D	E
Want to reduce their environmental footprint	A	B	C	D	E
Think they should be paid for protecting the environment	A	B	C	D	E
Are aware of the environmental impact of cattle ranching	A	B	C	D	E
Think long-term when making decisions about the farm	A	B	C	D	E
Express concern about generational relay in their farm	A	B	C	D	E

Section D.

Climate change

D1. What proportion of your ranchers express worry about **climate change**?

- Majority Many Some Very few

D2. Which **changes** related to climate to ranchers bring up most frequently? (*Check all that apply*)

- Higher than normal temperatures Lower than normal temperatures
 Shorter than normal rainy season Longer than normal rainy season
 Shorter than normal dry season Longer than normal dry season
 More intense or torrential rains More severe droughts
 Increasingly unpredictable weather

Other: _____

D3. In general, how do ranchers characterize the **impact** of climate change on their productive activity?

- Very negative Somewhat negative Neutral Somewhat positive Very positive

Section E.

Technical assistance and capacity building

E1. In your work with ranchers, how much **importance** do you assign to the following topics related to environmental protection?

	High	Medium	Low
Protecting or recovering forest fragments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protecting or reforesting of riparian corridors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increasing the amount of tree cover in the landscape	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protecting and recovering soils	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protecting wild plants and animals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using agrochemical inputs rationally	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incorporating native species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E2. Rate the level of training you have received from the Project on the following topics:

Topic	Sufficient	Some	Insufficient	None
Silvopastoral systems, establishment and management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biological diversity and productivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tree-planting and maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Micro-catchment and riparian corridor protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental impacts of cattle production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Restoration in grazing landscapes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Native species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strategies to improve landscape connectivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Animal management and nutrition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil management and conservation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate change and cattle ranching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E3. Are there **other topics** relevant to your work that you think should be included or strengthened during your trainings? _____

Section F.

Gender

F1. During your work as an extension agent, have you perceived any **differences** between working with female and male ranchers? (E.g. preference for particular practices, priorities, receptiveness, interest in environmental issues, etc.) *Explain*

F2. In your experience with the Project, do you think female extension agents face additional challenges to conduct their work? (E.g., credibility issues, receptiveness, interaction with ranchers, etc.) *Explain*

Thanks for your time and participation!