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Locally-Led and Co-Designed Adaptation Solutions, Including Monitoring Indicators La Montañita, Caquetá

María de los Angeles Jiménez - School of Environmental and Rural Studies, Pontificia Universidad Javeriana

Neidy Lorena Clavijo - School of Environmental and Rural Studies, Pontificia Universidad Javeriana

Luz A. Rodriguez – School of Environmental and Rural Studies, Pontificia Universidad Javeriana

Martha Vanegas Cubillos – Multifunctional Landscapes, Alliance Bioersity and CIAT

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1. Introduction

The CGIAR Climate Action Science Program aims to "advance science, innovation, and collaboration to transform food, land, and water systems toward a climate-resilient, equitable, and net-zero future." Within this framework, the research presented here supports the work of the Biodiversity-CIAT Alliance in developing the "Locally Led Adaptations" (LLA) component. This initiative seeks to assist actors in rural territories in addressing gender and other socioeconomic inequalities, recognizing that effective local adaptation requires the integration of new technologies, practices, and services within broader institutional and ecosystem contexts.

The design and implementation of a capacity-building plan serve as the foundation for applying citizen science framework. With this purpose, we seek to contribute to the co-creation and implementation of locally led adaptation (LLA) innovations and participatory decision-making processes that strengthen local capacities and promote social inclusion. This report systematizes the findings from fieldwork conducted with producers in the municipality of La Montañita (Caquetá) in November 2025. The reason to focus our efforts in the Municipality of La Montañita is that the School of Environmental and Rural Studies has been collaborating with the Agrosolidaria community since 2019.

The process was structured around four strategic pillars: (i) participatory diagnosis of climate risks, (ii) consolidation of co-designed adaptation solutions, (iii) definition of prioritization criteria, and (iv) establishment of indicators for the 2025–2027 roadmap. The purpose is to contribute to the construction innovation pathway for LLA, along with the co-design of a community-based research agenda for transforming food systems.

Our results show a clear convergence: the most critical risks are excess water and heat stress, both of which impact farm functionality through waterlogging and pasture degradation. These findings align with assessments by the SINCHI Institute regarding the high hydrometeorological vulnerability in the Caquetá River basin. Based on this diagnosis, a portfolio of solutions was developed, including technical pasture management, drainage implementation, and resilience measures such as tree planting and silvopastoral systems. These actions are consistent with scientific evidence supporting heat stress reduction and pasture management under excessive moisture conditions. For roadmap implementation, prioritization incorporates operational feasibility based on risk reduction effectiveness, sustainability for producers, partnerships with strategic allies (SENA, Banco Agrario, Agrosolidaria, and Asopanela), and integrated animal welfare management.

Finally, a monitoring system is proposed to capture effective adaptation through indicators related to productivity, local governance, and animal welfare. This framework aligns with

UNGRD guidelines and international directives that recognize animal protection as a key factor in the resilience of rural livelihoods.

2. Methodology

2.1. Semi-structured interviews

We designed and conducted four (4) semi-structured interviews with local producers – 2 men and 2 women (see interview guide in the appendix). These interviews served as a complementary qualitative input—not as a statistically representative sample—with the aim of exploring specific on-farm experiences in greater depth and triangulating the findings with those from the participatory workshop (collective matrix and plenary validation).

The interviews were conducted with male and female producers from the villages of La Y, Costa Rica, La Carpa, and La Estrella, with farm sizes ranging from 15 to 117 hectares (including one 79-hectare farm). The reported production systems include:

- Silvopastoral (dairy) – 1 case
- Dual-purpose rotational grazing – 2 cases
- Sugarcane – 1 case

The most critical effects reported were related to excess water (extended rainy seasons, intense rainfall, and flash floods during 2023–2025) and recent climate variability.

The selected indicators are grouped into the following categories:

- **Livestock productivity:** liters of milk per cow per day; calf mortality.
- **Crop productivity:** crop yields (measured by number of fruits, loads, or sacks).
- **Microclimatic regulation:** shaded area (in hectares) and records of high temperatures.

The interviews were used to **explore specific farm-level cases in greater depth** and to gather detailed information that does not always emerge during group exercises. This included:

- Characteristics of the farm and production system (village, area, main product/system)
- Concrete experiences with critical climate events (when they occurred and how they impacted the farm)
- Practices already being implemented
- Support and input needs

- **Selection of practical indicators**, such as:
 - Liters of milk per cow per day
 - Crop production
 - Calf mortality
 - Area with shade
 - Records of high temperatures

2.2. Participatory workshop

The purpose of the participatory workshop was to collaboratively prioritize actions and indicators with the broader group. A total of 21 people (9 men and 12 women) participated in the workshop, which took place on November 21, 2025. Participants ranged in age from 26 to 69 years, with an average age of 49.8. Only one participant was within the youth age group (18–28 years).

The workshop included three main components: an opening activity, group work, and a closing plenary. The participatory tools were designed to collectively identify adaptation solutions and monitor indicators at both farm and community levels.

Collective Participatory Matrix (main tool): This tool enabled the group to organize the discussion in a structured way to identify and prioritize problems and responses to climate events. Specifically, the matrix helped characterize:

- (i) the climate event,
- (ii) what happens on the farm (effects/impacts),
- (iii) what is currently being done (practices),
- (iv) when the event occurs or when action is taken,
- (v) who provides support (actors and assistance),
- (vi) what is needed (resources and inputs), and
- (vii) how to know if it works (practical verification criteria).

In addition, two extra columns were included for prioritization:

- (viii) Step 1 (for the upcoming year), and
- (ix) a simple indicator, in order to translate agreements into concrete and measurable actions.

The matrix was completed in a plenary session with input from both groups and served to consolidate diagnosis, solutions, and follow-up agreements into a single tool, as shown in Illustrations 1, 2, and 3.

Illustration 1. Completed Workshop Matrix

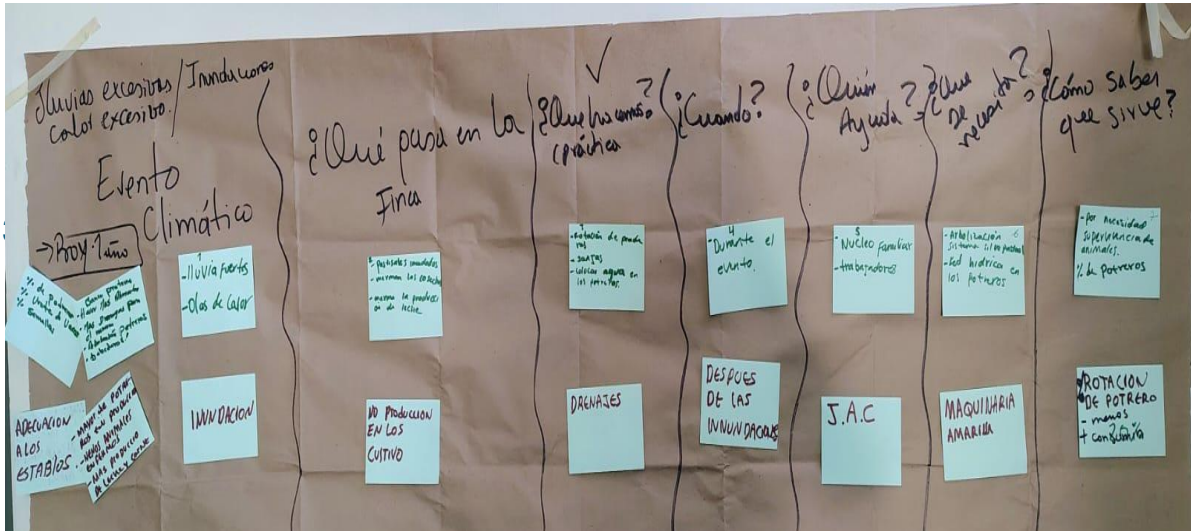


Illustration 2. Matrix Completion by Groups



Illustration 3. Presentation of the Matrix by Each Group's Leaders



3. Results and analysis

This section consolidates the findings from the fieldwork conducted with producers in La Montañita. The information is based on two complementary sources: (i) four semi-structured interviews carried out on November 19, 2025, and (ii) a participatory workshop held on November 20, 2025. During the workshop, participants collaboratively built a matrix to identify critical climate events, on-farm impacts, existing practices, needs, and management agreements. In addition, the interviews helped identify key enabling conditions, such as community organization, early warning mechanisms, and the role of supporting actors.

The results are organized according to the four main objectives of the report:

1. Participatory diagnosis of climate risks at the farm level.
2. Locally-led and co-designed adaptation solutions.
3. Criteria for action selection and prioritization.
4. Monitoring indicators for the 2025–2027 roadmap.

The triangulation between the interviews and the collective matrix allowed for a comparison of specific cases with group agreements. This approach strengthens the consistency of the findings and enhances their strategic value for decision-making, both at the individual farm level and within the wider community.

3.1. Participatory diagnosis of climate risks at the farm level

The diagnosis from the fieldwork presents a consistent picture: the most critical climate risks for local production systems are excess water (intense rainfall, prolonged wet seasons, and flooding) and heat stress (heatwaves). These events immediately disrupt farm operations due to waterlogging and muddy conditions, which reduce forage availability and lower productivity (declines in milk yield and crop harvests). Less frequent but highly severe events, such as landslides or mass movements, were also reported, with critical episodes recorded in 2023.

These findings align with institutional assessments for the Amazon and the department of Caquetá, which indicate very high levels of climate vulnerability, particularly regarding water resources and food security (Instituto Amazónico de Investigaciones Científicas – SINCHI, 2022). In addition, recent technical evidence for the region highlights scenarios of rising temperatures and more concentrated rainfall, reinforcing the urgency of implementing measures that support both farm functionality during rainy seasons and the

management of thermal comfort and water resources during drought (SINCHI, 2025; Ministerio de Ambiente y Desarrollo Sostenible, 2021; Gobernación del Caquetá, 2021).

A key finding is that risk is shaped not only by the nature of the event but also by its timing. However, the collected information reveals a gap in the systematic recording of seasonality. With the exception of one case that identifies the December–February window as a recurring period of impact due to heavy rains and pests, most records only mention the year of the event (e.g., avalanche in 2023 or extreme rainfall in 2025) without specifying the months. This lack of a risk calendar limits the community’s ability to anticipate and prepare, making it a priority element for the 2025–2027 action plan.

The need to strengthen temporal record-keeping aligns with territorial climate planning tools, which emphasize organizing actions around clear goals and monitoring indicators. Without a basic record of "critical windows", it becomes difficult to shift from a reactive risk management approach to informed, preventive decision-making (Ministerio de Ambiente y Desarrollo Sostenible, 2021; Gobernación del Caquetá, 2021).

In biophysical terms, farm sensitivity is influenced by two key components:

- Pastures: Species from the *Brachiaria/Urochloa* genus predominate (notably *decumbens*, *brizantha/Marandú*, and *humidicola*). Climate impacts are closely linked to management practices. During periods of heavy rainfall, continuous grazing accelerates pasture degradation due to compaction and waterlogging, while in heatwaves, the lack of rotational grazing worsens the decline in forage availability.
- Tree component: All farms report having trees in pastures or live fences, including local species such as *yopo*, *abarco*, *guamo*, *flor morado*, *melina*, *arrayanes*, *ahumado*, and *escobo*. According to local knowledge, these trees serve timber, fruit, and forage purposes. However, the variation in the level of detail regarding their location and use suggests the need for a detailed characterization of key species to guide future reforestation and silvopastoral system actions.

Academic evidence supports that, under waterlogged conditions, pastures show contrasting responses. Hydrotolerance studies identify *B. humidicola* as a resilient species under flooding, while others are highly sensitive. This highlights the importance of complementing drainage and water management works with informed decisions on species selection and soil fertility management based on soil types (Jiménez et al., 2015).

3.2. Co-designed adaptation solutions

The workshop supported the transition from diagnosis to a portfolio of collaboratively prioritized solutions. Discussions helped organize practices around four key strategic bottlenecks:

- Excess water
- Access to and distribution of water resources
- Shade and thermal comfort
- Food security within the production system

In response to the threat of heavy rains and flooding, the group prioritized actions aimed at restoring the operational functionality of farms, such as technical pasture rotation, the implementation and maintenance of drainage ditches, and replanting strategies to recover pastures after extreme weather events.

At the same time, to address heatwaves, medium-term strategies were emphasized, particularly the transformation of conventional livestock systems into sustainable silvopastoral models that enhance climate adaptation. This transformation includes increasing tree cover and establishing silvopastoral systems, along with improving water infrastructure and access in grazing areas.

To mitigate climate variability, the group also highlighted the need to implement protein banks and feed supplementation strategies to maintain productivity during critical periods.

The prioritization of tree cover and integrated soil management is fully aligned with scientific evidence. Research has shown that integrating trees into livestock systems is among the most effective responses to reduce heat stress, diversify forage quality, and improve animal welfare in tropical regions (Murgueitio et al., 2013; Sotelo et al., 2017). Similarly, the emphasis on drainage management aligns with technical literature stressing the need for such practices to sustain productivity under water excess conditions (Jiménez et al., 2015).

The matrix developed during the workshop (Table 1) serves as a comprehensive operational tool. It not only identifies key actions but also clarifies responsibilities, timelines, and verification methods, providing both feasibility and rigor to the 2025–2027 roadmap.

Table 1. Adaptation Matrix

Climate Event	What Happens on the Farm?	What Do We Do? (Practice)	When?	Who Helps?	What Is Needed?	How to Know It Works?	Step 1 (Next Year)	Simple Indicator
Heavy rains / Heatwaves	Flooded pastures; Crop losses; Reduced milk production	Pasture rotation; Drainage ditches; Place water in paddocks	During the event	Family unit; farm workers	Tree planting; Silvopastoral systems; Water infrastructure in paddocks	Animal survival; % of usable paddocks	Protein banks; Prepare homemade feed; More drainage; Tree planting in paddocks and near waterers	% of clean paddocks; % of cows sold; % of seed germination
	No crop production	Drainage systems	After the flood	Community action board (J.A.C)	Heavy machinery	Increased % of pasture rotation; + seeds for replanting	Maintain drainage; Food storage; Stable improvement	More productive paddocks; Fewer sick animals; Higher milk and meat production

Source: Participatory workshop

3.3. Selection/Prioritization Criteria for Adaptation Solutions

The analysis indicates that the prioritization of solutions must go beyond their technical impact to consider the real conditions for implementation. The interviews reveal that community coordination and early warning systems are uneven: while some producers report a lack of formal alerts, others rely on social media, WhatsApp, or the management of the Community Action Board (JAC). Currently, these channels operate reactively in response to emergencies, highlighting an incipient level of preparedness that needs to be strengthened through minimum agreements on roles, communication flows, and action protocols for each type of event.

Regarding the alliance ecosystem, recent collaborations have been recorded with entities such as SENA, Banco Agrario, Agrosolidaria Montañita, and Asopanela, in addition to occasional interventions by the Municipal Government. The involvement of these actors is primarily linked to access to financial services and credit lines, technical training, and the strengthening of organizational and commercial processes.

In practice, this means that the prioritization for the 2025–2027 roadmap should favor measures that meet five strategic criteria:

1. **Effectiveness in risk reduction:** Actions with a high impact on the protection of agricultural systems, ensuring the continuity of crops and the integrity of livestock assets.
 - Does the solution actually mitigate the impact of the climate event?
 - Does it help prevent damage or allow for faster recovery?
2. **Operational sustainability:** Measures that are feasible for producers to operate and maintain in the long term, ensuring their technical and financial autonomy.
 - Is it technically possible to implement with available knowledge and resources?
 - Is it affordable for farming families?
 - How dependent is it on external inputs?
 - Can it be applied using current means (tools, labor, time)?
 - Can it be maintained over time without high costs?
 - Does it improve future resilience?
3. **Impact on productivity:** Measures that affects the efficiency and output of a system, particularly in terms of how much it produces over time. In agriculture or livestock systems, impact on productivity can be measured by changes in:
 - Crop yields (e.g. fewer bales, fruits, or kilograms per hectare)
 - Milk production (e.g. liters per cow per day)
 - Meat production (e.g. weight gain per animal)
 - Labor efficiency (e.g. more or fewer hours needed to complete tasks)
4. **Capacity leveraging:** Solutions that make use of existing institutional support or clearly identify the technical assistance required for implementation.
 - Is it a practice known or accepted by the community?
 - Are there past positive experiences?
 - Is there technical or institutional support (UMATA, associations, SENA, etc.)?

5. **Contribution to family, animal and community wellbeing:** Refers to how a certain action, system, or practice improves the health, comfort, safety, and quality of life for both the animals on the farm and the families who manage them.

- Does it have added benefits? (e.g., improves soil, provides shade, supports biodiversity)
- Does it improve livestock comfort and health?
- Does it reduce labor burden and/or improve working conditions?

The relevance of including “operational sustainability” and “capacity leveraging” as criteria is confirmed by recent evidence from Caquetá. Studies indicate that barriers related to knowledge, implementation costs, and cultural or operational conditions limit the large-scale adoption of silvopastoral systems (Solarte et al., 2024).

With regard to alerts and coordination, the need for minimum agreements aligns with national guidelines for Agroclimatic Technical Roundtables, which emphasize technical and operational coordination and knowledge transfer as essential pillars for the functioning of regional preparedness mechanisms (Ministry of Agriculture and Rural Development, 2022).

3.4. Design of indicators and monitoring system

The results support the proposal of a structured monitoring system built on three levels:

1. **Outcome indicators** – focused on productivity;
2. **Capacity indicators** – related to the availability of critical resources;
3. **Process indicators** – tracking the adoption of adaptation measures.

The interviews revealed that producers tend to prioritize metrics linked to their daily farm management, such as milk production (liters/cow/day) and crop yields measured in local units, providing a solid basis for technical follow-up.

Additionally, the system integrates comprehensive risk management through animal welfare and public health protocols, ensuring contingency plans for animal health, shelter, and feed during extreme climate events.

However, the analysis also identifies **four critical gaps** that must be addressed to ensure the monitoring system effectively tracks adaptation progress:

1. **Seasonality Records** – Systematize data on specific “critical months” to improve anticipation and preparedness.

2. **Coverage Metrics** – Develop measurable indicators for shade and tree cover that go beyond qualitative descriptions.
3. **Local Governance** – Evaluate the effectiveness of early warning systems and community coordination, which are key to operational response.
4. **Institutional Support** – Track technical and organizational assistance received, to assess the feasibility of scaling up successful measures.

Consistent with this approach, animal health and welfare monitoring during crisis periods is essential, ensuring that adaptation efforts safeguard both livestock assets and public health.

Table 2. Proposed Minimum Set of Monitoring Indicators (2025–2027 Roadmap)

Dimension	Indicators
Productivity	Volume of milk (liters/cow/day); Crop yield per unit (fruits, sacks, bundles)
Water Resources	Number of days per month with effective water availability for livestock and irrigation
Shade & Thermal Comfort	% of paddocks with functional tree cover (shade)
Farm Functionality	Days of inoperability due to waterlogging or % of usable land during rainy season
Governance	Number of active alert channels; Implementation level of community protocols
Animal Welfare & Health	Calf mortality rates; Prevalence of key diseases; Verification of contingency measures (e.g., availability of shelters, water, and forage reserves)

This framework ensures that monitoring becomes a strategic decision-making tool at both the farm and municipal levels. Taken together, this set of practical, low-cost indicators will allow for effective tracking of the adaptation roadmap, assessing not only productive outcomes but also:

- Strengthening of local capacities;
- Improved community governance; and
- Effective animal welfare protocols in response to the climate crisis.

The proposed monitoring logic aligns with institutional frameworks such as Colombia's Integral Plan Climate Change Plan for Climate Change Management guidelines, which recommend structuring adaptation through actions with clear goals and indicators (Ministry of Environment and Sustainable Development, 2022).

The integration of animal welfare is also backed by both national and international frameworks. Colombia's Protocol for Animal Emergency Response emphasizes coordination, role definition, and action tracking (UNGRD, 2024a), adopted via Resolution 1295 of 2024 (UNGRD, 2024b). Internationally, guidelines by the World Organisation for Animal Health (WOAH, 2016) recommend linking disaster risk reduction with public veterinary health strategies.

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Appendix 1 - Interview Guide : “Locally Led and Co-Designed Adaptation Solutions, Including Monitoring Indicators”

1. Introductory Information

- a) Name of the village (vereda):
- b) Name of the farm (if applicable):
- c) Location and size of the farm (ha):
- d) What does your farm produce?
- e) Herd size: Number of milking cows ____ / total ____
- f) System: Continuous grazing (); Rotational grazing (); Silvopastoral (); Confined/semi-confined ()
- g) Main product: Milk (); Meat (); Dual purpose ()

2. Climate

- a) Most critical climate event in the last 2–3 years:
 - b) What was it? (drought, heatwaves, extreme rainfall, landslides, flooding, wildfires, climate-related pests, other):
-

- c) When was the worst occurrence? (year/month): _____
 - d) Main impact on crops/livestock (e.g., reduced milk production, forage shortage, disease, calf mortality, infrastructure damage), or other impacts such as nearby forests, canals, streams, etc. (1 sentence):
-

- e) Can you quantify it? Liters/cow/day before: _____ during the climate event: _____
- f) Days without water or with rationing: _____ days
- g) In which months does it usually occur? _____
- h) How frequently do these climate events happen? _____

3. Water Management

- a) During droughts, how do you secure water? (ponds/wells, tanks, hoses, not applicable): _____
- b) During the rainy season, do you do anything to manage excess water? _____

4. Soil and Runoff Management

- a) What are the most noticeable effects on the soil during excessive rainfall and during drought?
- b) What do you do to improve and maintain the soil under those conditions (excess water and drought)?
- c) Are you familiar with organic fertilizers? Which ones?
- d) Do you know how to prepare organic fertilizers? Give an example.
- e) Do you use contour lines, live barriers, or drainage systems? (yes/no). If yes, where?

5. Crop Diversification

- a) What crop combinations do you have (e.g., plantain–cassava–cacao/shade-grown coffee)?
Why did you choose these combinations?
- b) Do you have home gardens? What do you grow in them?

6. Pest and Disease Management

- a) How do you manage crop pests and diseases?
- b) Are you familiar with or do you use bioproducts or insect traps? (yes/no).
If yes: which ones?

7. Livestock: Shade and Forage

- a) Do you have trees in pastures/live fences? (low / medium / high density)
- b) What types of trees do you have in pastures and along property boundaries? What do you know about these species?
- c) Besides providing shade, what other uses of trees on the farm are you aware of?
- d) What type of pasture do you have, and how do you manage it?
- e) Do you preserve forage (hay/silage)? (yes/no — if yes, how many days does it last?)

8. Livestock: Feed and Forage

When pasture is scarce, you...

- a) Have silage (); Have hay (); Buy feed (); Grow forage crops/trees (e.g., *matarratón*, *leucaena*, others) ()
- b) Adjust stocking rate / extend grazing rotation ()
- c) Available silage: _____ tons/kg
- d) Number of reserve days: _____

9. Livestock: Water During Drought

- a) How do you secure water? (tank/well, rainwater harvesting, additional troughs, others):

- b) Total water storage capacity: _____ liters
- c) Days of stored water available: _____ days
- d) Last maintenance (month/year): _____ / _____

10. Livestock: Heat and Rain

Heatwaves (shade and water):

- a) Shade from trees (); Shade mesh (shade net/sarán) (); Change grazing/milking schedule (); Add more water troughs ()
- b) Number of trees per pasture (few / medium / many): F (); M (); M ()
- c) What tree species do you use in the pasture?

Heavy rains (mud and diseases):

- d) Do you move the herd to prevent waterlogged pastures? (yes/no). If yes, how?
- e) Do you implement ditches/drainage systems? Yes___ No_____
- f) Do you move livestock to dry areas for resting? Yes___ No_____

11. Livestock: Health and Care

- a) Up-to-date health calendar (); Filtered/clean water (); Good milking practices ()
- b) Mastitis (approx. cases/month): _____ (leave blank if unknown)
- c) Hoof problems (approx. cases/month): _____ (leave blank if unknown)

d) Deworming (approx. frequency): _____

e) Home remedies used – which ones?: _____

12. Organization and Alerts

a) Do you receive alerts or coordinate with the community during climate events? (WhatsApp / Community Action Board / committee)? (yes/no)

b) What works well, and what doesn't?

13. Supporting Actors

a) Who has supported you recently in your productive and organizational processes? (UMATA / Mayor's Office, livestock association, SENA, Corpoamazonia, NGOs, Banco Agrario, others): _____

b) What kind of support did they provide? (technical assistance / inputs / credit / marketing): _____

15. Choose 2 indicators you consider most practical and easy to measure on your farm:

- **Liters/cow/day** – *How to measure:* (Total milk in liters per day) ÷ (Number of milking cows).
- **Crop yield** – *How to measure:* by number of fruits, by load, by bag, etc.
- **High temperatures** – *Optional notes or observations.*
- **Days with stored water** – *How to measure:* record the day you fill the tank and the day it runs out (or when rationing begins).
- **Losses due to rainfall (%)** – *How to measure:* % loss = (Quantity lost ÷ Expected quantity) × 100.
- **Income per product** – *How to measure:* Price × Quantity sold (per product).
- **Calf mortality** – *How to measure:* % mortality = (Dead calves ÷ Live-born calves) × 100 (in 6–12 months).
- **Shaded area (ha)** – *Quick measurement:* total shaded pastures × their approximate area.

Appendix 2 – Matrix of Locally Led and Co-Designed Adaptation Solutions

This matrix allows for the validation of the information collected during interviews with participants who attended the workshop. Example of how the matrix can be filled out.

Climate Event	What Happens on the Farm?	What We Do (Practice)	When?	Who Helps?	What's Needed?	How Do We Know It Works?
Drought (severe dry season)	Lower milk production; heat stress	Store water in tanks/wells and provide water more frequently	Before and during drought	UMATA, JAC, family, producers, livestock association	Tanks, geomembranes, hoses, labor	Days with water available; liters/cow/day; body condition score (BCS)
Drought	Forage shortage	Forage conservation (hay/silage); forage banks (<i>matarratón</i> , <i>leucaena</i>)	Before drought (preparedness)	Producers, UMATA, cooperatives, family	Choppers, silo bags, seeds, labor	Forage reserve days; amount of silage (tons, kg)
Heatwave	Stressed cows	Natural/artificial shade; silvopastoral systems; adjust milking/grazing hours	Before and during heatwaves	Producers, UMATA, JAC, families	Shade nets, trees, additional water troughs	Calmer cows; better milk yield; less panting
Heavy rain / flooding	Muddy areas; hoof diseases	Dig ditches/drainage channels; provide dry resting zones	Before and during rainy season	Producers, UMATA, risk committee, neighbors	Shovels, pipes, dry flooring materials	% of usable pastures; fewer hoof issues

Climate Event	What Happens on the Farm?	What We Do (Practice)	When?	Who Helps?	What's Needed?	How Do We Know It Works?
Heavy rainfall	Parasites and mastitis	Sanitary calendar; dry bedding; good milking practices	During and after rain	Producers, dairy technicians, UMATA	Salts, dewormers, lime, absorbent materials	Somatic cell count; fewer mastitis cases/month; FAMACHA scoring
Frost / extreme cold	Calf mortality; frost-damaged pastures	Windbreak curtains; deep/warm bedding; energy supplements	Before and during frost	Producers, UMATA, JAC	Windbreak trees, straw/shavings, supplements	Neonatal mortality; shelter temperature; daily weight gain
Strong winds	Damaged roofs, fences, pens	Live fences; reinforce roofs and pens	Before windy season	Producers, JAC, family, neighbors	Posts, wire, trees, anchors	Roofs and fences remain intact
Wildfires	Burned pastures, livestock at risk	Firebreaks; water points; evacuation plan	Before and during dry season	Producers, community brigades	Machetes, backpack sprayers, water tanks	Less area burned; faster response
Prolonged drought	Emergency feed purchase	Staggered purchasing plan;	Before and during crisis	Association, UMATA	Contracts, storage facilities	Days of feed autonomy; cost per liter of milk

Climate Event	What Happens on the Farm?	What We Do (Practice)	When?	Who Helps?	What's Needed?	How Do We Know It Works?
		associative agreements				
Dirty/murky water	Diarrhea; lower water intake	Protect springs; fence off water sources; filter water	Before and during rainy season	Family, JAC, rural water board	Stakes, wire, simple filters, fencing	Clearer water; fewer diarrhea cases
Rising costs / crisis	Lack of money for feed	Buy feed with neighbors (agreements); homemade feed	During prolonged drought	JAC, producers, neighbors, water board	Storage, purchase agreements, seeds, crops, hay	Days of autonomy; lower cost per liter of milk
Drought	Less water and milk	Well + water tank (rainwater harvesting)	Drought	UMATA, JAC, family, producers	Tank, hoses, labor	Days with stored water; liters/cow/day

Appendix 3 – Workshop Script – “Locally Led and Co-Designed Adaptation Solutions, Including Monitoring Indicators”

Objective:

To collect key farm-level information for group work and plenary sessions, where the information gathered through interviews will be complemented and validated collaboratively.

Setup (5–10 minutes before the session)

- Tape sheets of newspaper or kraft paper on a board or wall.
 - Draw a large table with the following column headers in **uppercase**:
-

CLIMATE EVENT

WHAT HAPPENS ON THE FARM?

WHAT DO WE DO (PRACTICE)?

WHEN? (before / during / after)

WHO HELPS? (UMATA / Community Action Board / family / neighbors)

WHAT'S NEEDED? (inputs / tools)

HOW DO WE KNOW IT WORKS? (simple evidence: # of paddocks, open ditch, etc.)

Materials

- 1–2 sheets of newspaper or flip chart paper + tape
- Thick markers (black for titles, one color per group)
- Sticky notes or scrap paper for each group to draft responses
- Cell phone to take a photo of the completed matrix at the end

Roles

- **Facilitator:** Guides the timing and flow of the activity
 - **Group representative:** Comes up to the board and fills in one row of the matrix on behalf of their group
-

Session Flow – 120 Minutes

0–10 min — Opening (Plenary)

- **Key message:** *“We’re not repeating interviews — today we’re complementing and validating together as a group.”*
 - Explain that each group will work at their table and choose a representative to fill in the matrix on the board.
-

10–20 min — Table Instructions

- Each group selects **one climate event** (e.g., drought, rain, heat).
 - On **post-its**, they answer the 7 matrix columns using short phrases.
 - Reminder: **one event = one row**. Avoid long paragraphs.
-

20–60 min — Matrix Completion (Group Turns)

- In order, each **group representative** comes to the front and writes their row on the large matrix.
- Encourage short, clear responses (example format):

- **EVENT:** Drought
 - **WHAT HAPPENS?:** Troughs dry up; milk drops
 - **PRACTICE:** Connect tank to troughs; give silage
 - **WHEN?:** During
 - **WHO HELPS?:** Family + Community Board
 - **WHAT'S NEEDED?:** 30m hose, fencing posts, silage
 - **HOW TO KNOW IT WORKS?:** 3/4 troughs have water
- **Tip:** Use a different color for each group to distinguish contributions.
-

60–90 min — Review and Additions (Plenary)

- Read each row out loud. The group may **correct, clarify, or complete** info (e.g., specify plot, dates, inputs).
-

90–115 min — Group Agreements

- Mark with a ✓ the practices that **already work well** and should be maintained or scaled up.
 - Mark with an X the practices that **haven't worked** or need to be reconsidered.
 - For each **prioritized practice**, write below:
 - **Responsible person, supporting actors** (UMATA / Community Board / family / neighbors),
 - **What will be done, and when.**
-

115–120 min — Closing and Evidence Collection

- Take a **clear photo** of the completed matrix.
 - Close the activity.
-

Final Notes

- Keep entries **short and precise** (8–10 words per cell).
- Always specify a **concrete location** (plot/paddock/area).
- For indicators, use simple evidence (e.g., “# of paddocks with water/shade”).