Supplementary Material S1

Table S1. Key plant species in the restored corridor of Colibris Stream, ranked by ecological relevance for riparian forest restoration (Data from the iNaturalist project, 2019-2025).

Scientific Name	Common Name	Observations	Status	Successional Role	Key Ecological Functions / Notes
Paubrasilia echinata	Pau-brasil	3	Native (Endangered)	Secondary to Climax	Symbolic species of the Atlantic Forest, hardwood tree, slow-growing, high conservation value.
Pterygota brasiliensis	Pau-rei	6	Native	Secondary to Climax	Large structural tree, important for permanent canopy formation and nutrient cycling.
Schinus terebinthifolia	Aroeira-pimenteira	15	Native	Pioneer	Nitrogen-fixing, attracts frugivorous birds, fast-growing, provides early shade.
Guazuma ulmifolia	Mutamba	12	Native	Pioneer	Rapid biomass production, tolerant of degraded soils, fruits for wildlife.
Inga spp.	Inga	10	Native	Pioneer/Secondary	Nitrogen-fixing, flowers support pollinators, provides shade for establishing other species.
Erythrina spp.	Eritrina/Mulungu	8	Native	Pioneer	Aggressive nitrogen-fixer, used as a "nurse tree" for initial protection in syntropic planting.
Cecropia spp.	Embaúba	18	Native	Pioneer	Early colonizer, fruits are important for fauna, indicator of initial succession.
Tibouchina spp.	Quaresmeira	7	Native	Secondary	Soil stabilizer, ornamental flowering, supports pollinators.
Syagrus romanzoffiana	Jerivá	5	Native	Secondary	Native palm, provides food (nuts) for diverse fauna, adds vertical structure.
Miconia spp.	Pixirica	20	Native	Pioneer/Secondary	Understory shrub/tree, very high natural recruitment, indicator of active regeneration.

Supplementary Material S2

Table S2. Participation dynamics in the Córregos da Tiririca Collective workdays (2019–2025)

Workday (#)	Date	Participants (Minimum)	Main Activity	Contextual Notes
1	Oct 2019	12	Initial diagnosis and site marking	Founding core group.
2	Jun 2019	54	Participatory diagnostic walk and planning	Peak of community mobilization for participatory diagnosis.
3	Jul 2019	7	Intensive soil preparation ("nest" digging)	Consolidation of the operational core.
4	Sep 2019	7	Dense planting in the "nests"	Application of the syntropic technique.
5	Oct 2019	11	Planting and initial maintenance	Group stabilizes.
6	Jan 2020	15	Planting and area management	Activity pre-pandemic.
7	-	CANCELLED	-	Cancelled due to the COVID-19 pandemic.
8	Apr 2023	27	Seedling planting in a consolidated area	Post-pandemic restart recruitment peak.
9	Apr 2023	11	Biomass management (pruning soil cover)	Maintenance of the established system.
10	Jun 2023	8	Planting and monitoring	Focused activity.
11	Jun 2023	10	Management and planting	Stable working group.
12	Aug 2023	23	Expansion of planting to new areas	Another recruitment/expansion peak.
13	-	CANCELLED	-	Cancelled due to heavy rains.
14	Sep 2023	14	Monitoring and area inspection	Focus on observation and care.
15	Oct 2023	6	Planting and cleaning (children's visit suspended)	Activity maintained despite rain.
16	Nov 2023	6	Construction of new "nests" planting (~100 seedlings)	Activity maintained without photos despite rainy weather.
17	Dec 2023	6	Planting (~100 seedlings and seed "muvucas")	Activity maintained without photos
18	Apr 2024	15	Planting in a new area corridor expansion	Scaling and replication of the method.
19	Apr 2024	20	Management and planting	Consolidated group high turnout.
20	Apr 2024	15	Maintenance and planting	Stable participation.
21	Feb 2025	19	Management and planting activities	Continued dedicated work.
22	May 2025	8	Focused planting activity	Smaller focused group.
23	May 2025	10	Collaborative planting with partners	Partnership activity.
24	Jul 2025	17	Pruning planting and area management	Stable participation in maintenance.
25	Jul 2025	18	Maintenance and management activities	Ongoing stewardship.
26	Jul 2025	23	Pruning planting and public advocacy event	High engagement civic action.

Supplementary Material S3

Table S3 - Operational guide for the four-phase community-led urban stream restoration framework

Phase	Key Objectives & Min. Team	Typical Timeline	Key Actions & Practical Considerations	Potential Challenges / "Failure Points" & Mitigation
1. Social Foundation	• Build trust and a shared identity. • **Min. Team:** 3-5 committed individuals (e.g., neighbors, local activists).	1–3 months	• Informal meetings and walks along the stream. • Map local skills and interests. • Initial, informal contact with municipal environmental agencies.	• **Challenge:** Lack of a clear common purpose; difficulty identifying first members. • **Mitigation:** Focus on a tangible, local problem (e.g., erosion, flooding). Use existing community networks.
2. Participatory Diagnosis & Planning	• Co-produce a shared understanding of the site's degradation and potential. • **Engage a broader group:** ~10-20 people from the community.	2–4 months	• Collective diagnostic walks ("walk-shops"). • Historical research (old maps, interviews). • Identify pollution sources (sewage, waste). • Draft a simple technical project to seek formal authorization.	• **Challenge:** Conflict with landowners or residents used to dumping waste; discouragement from the scale of degradation. • **Mitigation:** Transparent communication; frame intervention as a benefit (beautification, flood reduction).
3. Pilot Implementation & Adaptive Learning	• Learn by doing and achieve visible early "wins". • **Establish the core working group:** 8-12 active volunteers.	6–12 months	• First syntropic planting ("nesting") in a pilot section. • Establish a regular *mutirão* (workday) rhythm (e.g., monthly). • Start participatory monitoring (e.g., photos, iNaturalist).	• **Challenge:** Initial plant mortality if follow-up care fails; persistence of pollution sources; vandalism. • **Mitigation:** The *mutirão* itself is the maintenance mechanism. Document progress to build legitimacy.

			• **Tools/Materials:** Basic hand tools (hoes, shovels, pruning shears), donated mulch, seedlings from volunteers or local nurseries.	
4. Scaling & Institutionalizing Care	• Ensure long-term stewardship and expand the restored area. • **Maintain a stable core:** 10-15 dedicated volunteers.	Ongoing (2+ years)	• Scale planting to adjacent areas. • Formalize partnerships (e.g., for green waste chipping). • Implement more structured participatory monitoring. • Manage knowledge and volunteer turnover.	• **Challenge:** Volunteer fatigue ("burnout"); **overdependence on external funding that can undermine community ownership**; natural disturbances. • **Key Insight & Mitigation:** The project's foundation is the **permanent community core**. External resources (grants, paid labor) should support and empower this core, not replace it, ensuring continuity beyond specific funding cycles. The social process is the primary infrastructure.

Supplementary Material S4

Table S4 - Quantitative ecological indicators of Colibris Stream restoration (2019–2025).

Indicator	Monitoring Method	Result / Observation
Species Recorded (total number)	Citizen Science (iNaturalist)	194
Biodiversity Observations (total number)	Citizen Science (iNaturalist)	561
Canopy Cover (final state)	In-situ visual assessment & comparative photo analysis	>70% (closed and continuous canopy)
Signs of Erosion (final state)	Visual monitoring & community reports	None / Eliminated in the restored area
Plantings Carried Out	Collective's field log	>2 000 seedlings and "muvuca" seed mixes

Supplementary Material S5

Table S5. Selected fauna species recorded in the restored corridor of Colibris Stream, evidencing ecosystem function recovery (Data from the iNaturalist project, 2019-2025).

Group	Scientific Name	Common Name	Observations	Ecological Role / Note
Bird	*Ardea alba*	Great Egret	5	Top predator, indicates aquatic prey availability.
Bird	*Fluvicola nengeta*	Masked Water-Tyrant	1	Insectivore, tightly associated with riparian habitats.
Bird	*Sicalis flaveola*	Saffron Finch	1	Seed disperser, indicates grassland/forest edge.
Butterfly	*Phoebis philea*	Orange-barred Sulphur	1	Pollinator, attracted to flowering plants in the area.
Amphibian	*Boana albomarginata*	–	1	Bioindicator of habitat humidity and structural complexity.
Arthropod	Genus *Canthon* (Coleoptera)	Dung beetle	2	Nutrient cycling, soil aeration.
Arthropod	Genus *Amynthas* (Oligochaeta)	Earthworm	1	Soil engineer, improves structure and fertility.