TIKUNA TERRITORIAL FOREST CONSERVATION PLAN

Colombian Amazon Basin | 2025-2035

By: Environmental Women ORG

TIKUNA TERRITORIAL FOREST CONSERVATION PLAN

Puerto Nariño, Colombian Amazon | 2025-2035

Designed by Environmental Women Org

Recipient community: Tikuna Indigenous communities of the Colombian Amazon

Figure 1. River corridor of the planning landscape, central to mobility, monitoring, and ecological connectivity.

"Standing forest is not only habitat; it is the territorial infrastructure of Tikuna life."

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Plan profile at a glance

Parameter	Planning reference
Timeframe	2025-2035
Lead designer	Environmental Women Org
Recipient community	Tikuna Indigenous communities, Puerto Nariño, Amazonas, Colombia
Planning extent	10537 hectares of Amazon forest landscape
Priority conservation frame	Amacayacu-associated KBA CO150 and IBA CO083
Main quantified pressures	208 illegal mining points; >600 Tikuna laborers/year recruited by mining; 16,000 ha/year forest loss associated with mining in the broader landscape; 90 illegal timber sources in 4,200 ha; 308 trees/month extracted; 32 ha/month opened by fire for agriculture and cattle
Strategic response	Customary governance, ranger brigades, restoration and phytoremediation, environmental education, territorial communication, and conservation-based livelihoods

EXECUTIVE SUMMARY

The 2025-2035 Conservation Plan for the Tikuna territory in Puerto Nariño, Colombian Amazon, is a ten-year biocultural roadmap designed by Environmental Women Org together with Tikuna families and local leaders to keep forest standing, restore degraded sites, reduce toxic contamination, and strengthen customary governance over 10537 hectares of Amazonian landscape. The planning area lies within a globally important conservation setting associated with the Key Biodiversity Area Parque Nacional Natural Amacayacu (CO150) and the Important Bird Area Parque Nacional Natural Amacayacu (CO083). This is therefore not a local environmental management note; it is a territorial defense instrument for an internationally significant forest mosaic where biological integrity, river dynamics, community food systems, and intergenerational knowledge are all under direct pressure.

The baseline diagnosis identifies three dominant and interacting drivers of forest degradation. First, illegal gold and silver extraction networks use backhoes, pumps, and mercury-based amalgamation to open pits, reroute waterways, and contaminate forest soils, wetlands, and riverine habitats. Community and organizational field evidence indicates at least 208 illegal mining points in the target landscape, the recruitment of more than 600 Tikuna laborers each year, forest clearing on the order of 16,000 hectares annually, and mercury residues in soils above 0.93 micrograms per gram, far above the 0.3 micrograms per gram critical threshold used as an international risk reference. Second, illegal timber trafficking targets high-value species such as rosewood (Aniba rosaeodora), cedar (Cedrela odorata), mahogany (Swietenia macrophylla), and sapan (Clathrotropis brunnea). Around 90 trafficking sources have been identified in 4,200 hectares, with approximately 308 trees cut per month and hidden in forest islands before moving into illegal trade chains. Third, the use of fire to convert forest to cattle or short-cycle agriculture removes an estimated 32 hectares per month and accelerates a cycle of soil exhaustion, repeated clearing, and renewed dependence on forest destruction.

The plan responds to that triple pressure through a single strategic premise: forest conservation will only become durable if Tikuna customary authority, family labor, and youth leadership are redirected away from extractive criminal economies and into a standing-forest economy that the community can govern itself. For that reason, the plan combines four mutually reinforcing pillars. The first is a technical conservation strategy: community natural areas, river and wetland surveillance, anti-mining and anti-logging ranger brigades, restoration and phytoremediation, native-species nurseries, and community monitoring of mercury, forest cover, and illegal access routes. The second is an education strategy rooted in Tikuna territorial pedagogy, school and community learning, women's knowledge, and youth stewardship. The third is a communication strategy using community assemblies, river-based outreach, visual materials, school mobilization, and bilingual content where possible, so that forest protection becomes publicly visible and socially legitimate. The fourth is a sustainability strategy that links conservation with legal livelihoods: restoration employment, nursery production, fire-free agroforestry, non-timber products, community ecotourism, and local monitoring services.

By 2035, the plan seeks measurable transformations: full community conservation management over 10537 hectares; a permanent network of Tikuna ranger brigades; recovery of degraded mining and burn sites through restoration and phytoremediation; a documented reduction in illegal timber extraction and forest conversion pressure; strengthened local governance over access, use, and surveillance; and a new generation of young Tikuna conservation leaders capable of defending the territory with scientific, legal, and cultural tools. This plan is therefore both a conservation instrument and a governance instrument. It protects forest structure, but it also protects the social arrangements that make long-term conservation possible.

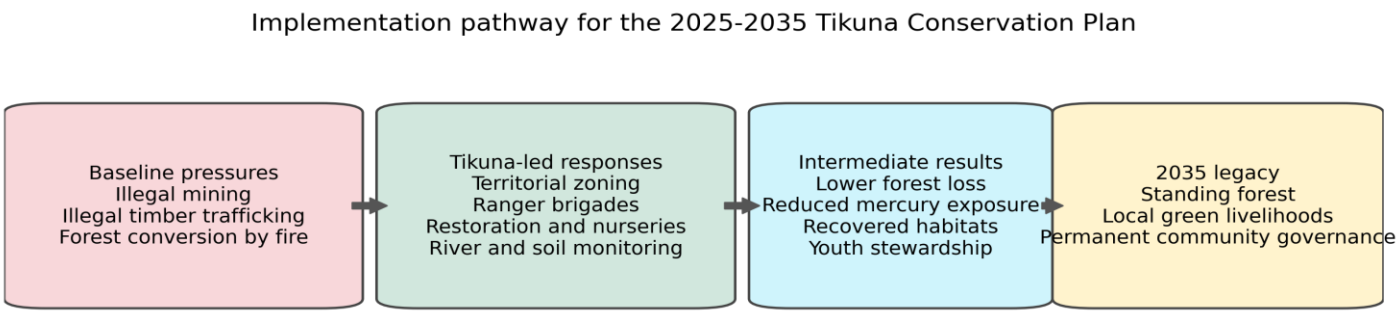


Figure 2. Implementation pathway of the 2025-2035 conservation model.

1. TERRITORIAL AND BIOCULTURAL CONTEXT

The planning area is located in the municipality of Puerto Nariño, department of Amazonas, Colombia, in a riverine forest landscape associated with the Amacayacu conservation complex and the wider Colombian Amazon basin. The project coordinates provided for the intervention corridor extend from Quebrada Pichuna (3°44'12.7"S, 70°30'59.7"W) to Caballococha (3°50'07.6"S, 70°24'05.4"W), framing a zone where floodplain dynamics, terra firme forests, streams, wetlands, and family-use areas interact in a single ecological system. Although the conservation plan is organized around 10537 hectares, its influence extends beyond a polygon on a map because Tikuna mobility, resource use, ecological knowledge, and exposure to illegal economies all move through rivers, footpaths, flood cycles, and social kinship routes. For that reason, the unit of planning is not just the forest stand; it is the forest-river-community system.

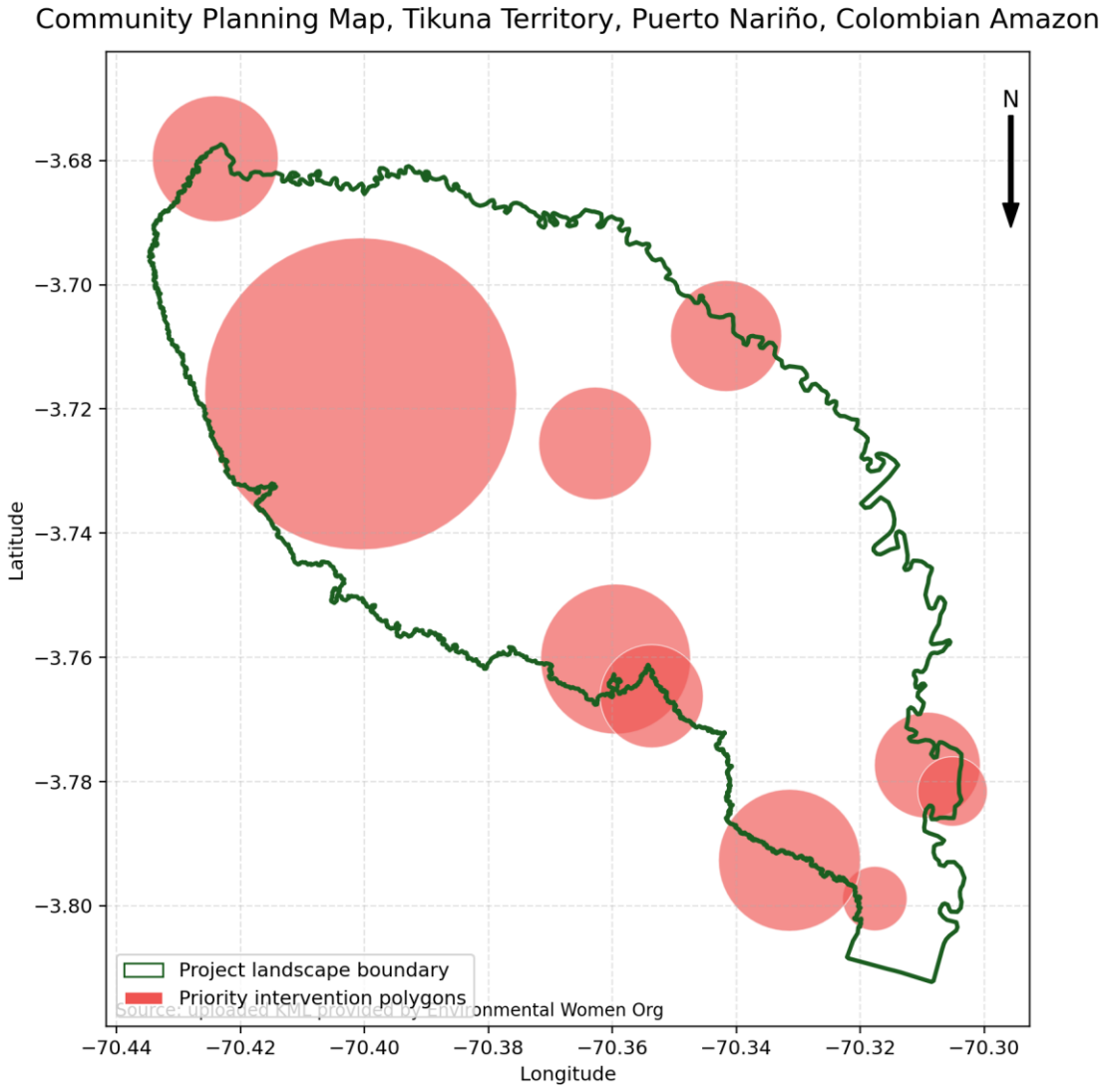
This territorial system has exceptional ecological relevance. The Amacayacu landscape supports mature Amazonian forests, flood-dependent habitats, nursery areas for fish, and habitat for birds, mammals, amphibians, and invertebrates whose persistence depends on contiguous canopy, clean water, and intact soil processes. The project area is associated with the Key Biodiversity Area Parque Nacional Natural Amacayacu (CO150) and the Important Bird Area Parque Nacional Natural Amacayacu (CO083), which underscores the international value of maintaining ecological continuity, especially in river margins, old-growth stands, and disturbed sites that still retain natural regeneration potential. In conservation terms, the landscape is not valuable only because of the number of species present; it is valuable because it still functions as a connected biocultural territory where forest cover, community use, and hydrological processes remain interdependent.

For Tikuna families, the forest is neither empty space nor a reserve isolated from daily life. It is a lived territory that sustains mobility, food, medicinal gathering, water regulation, construction materials, cultural practices, and community identity. Family chagras, fishing circuits, navigation routes, gathering areas, footpaths, and community meeting spaces coexist with areas that must remain under stricter protection. That is why this plan is explicitly based on uses and customs. It recognizes that conservation cannot be imposed as a purely external ecological restriction. Instead, it must emerge from community rules regarding where and when activities are allowed, who monitors access, how collective decisions are taken, and how knowledge is transmitted between elders, women, youth, and children.

The same biocultural logic also explains why environmental degradation has become so dangerous. When mining opens pits and dumps mercury into wetlands, it does not only affect wildlife: it disrupts food webs, fishing security, and the safety of water and sediments that families use. When traffickers remove seed trees such as mahogany, cedar, rosewood, and sapan, they fragment habitat and also weaken the ecological

inheritance available to future generations. When the forest is burned to open short-lived agricultural plots, the resulting soil collapse forces the frontier to move again, destabilizing family production and accelerating deforestation.

This plan therefore treats the Tikuna territory as a conservation landscape inhabited and governed by people, not as a protected island detached from society. The core management principle is that the most durable conservation outcomes will come from reinforcing the community's own territorial authority, making standing forest more valuable than illegal extraction, and rebuilding a practical alliance between customary stewardship and modern conservation tools. In that sense, the plan is biocultural by design: it uses ecological science to strengthen Tikuna territorial continuity, and it uses Tikuna territorial continuity to sustain ecological science in the field.



Map 1. Community planning map produced from the uploaded KML geometry provided for this plan. The green outline marks the planning landscape; red polygons show priority intervention clusters.

2. BASELINE THREAT ANALYSIS

The conservation problem in the Puerto Nariño Tikuna landscape is driven by three direct pressures that are already measurable in the field and that reinforce one another economically, spatially, and socially: illegal mining, illegal timber trafficking, and forest conversion for agriculture and cattle. Their interaction produces a far more serious conservation scenario than any single threat viewed in isolation. It creates forest loss, pollution, fragmentation, labor capture, and institutional weakening simultaneously.

1. Illegal mining of gold and silver is the most destructive pressure because it removes forest cover while also causing toxic contamination. Field evidence collected by Environmental Women Org and its collaborators indicates at least 208 illegal mining sources in the target Amazon forest. These structures recruit more than 600 Tikuna Indigenous people per year as laborers, which means that the extractive economy is not operating outside the social fabric but through it. Mining is associated with the clearing of approximately 16,000 hectares of forest per year in the broader intervention landscape. The technical footprint of each extraction point is severe: to obtain 1 gram of gold, operators typically require four workers, a backhoe to remove about 6 tons of earth from the forest floor, the continuous discharge of roughly 1,000 liters of water per second, and the application of 10 grams of mercury during amalgamation. Backhoes dredge river margins, alter water courses, and create artificial pools where mercury is mixed with sediment. The residual mercury is dumped directly into soils and wetlands. Soil values above 0.93 micrograms of mercury per gram have already been documented, compared with a critical reference level below 0.3 micrograms per gram. The appearance of methylmercury traces in forest environments is especially alarming because it implies conversion into a form that bioaccumulates across aquatic food webs, ultimately threatening fish, birds, and people.

2. Illegal timber trafficking is the second major driver. In the Tikuna landscape it is deeply normalized because traffickers acquire felled trees from local people, store trunks in concealed forest islands, and then move the wood into illegal commercial networks. Around 90 trafficking sources have been identified in roughly 4,200 hectares, and extraction is estimated at 308 trees per month. The most affected species are rosewood, cedar, mahogany, and sapan, all of them ecologically important, commercially valuable, and slow to replace when removed from mature forest. This pressure does not simply reduce standing biomass. It selectively removes seed sources, opens access routes, increases canopy breaks, and makes previously intact zones more vulnerable to future incursions by miners, hunters, or colonizing agriculture.

3. Forest conversion for agriculture and livestock through burning is the third pressure. In the target territory, approximately 32 hectares per month are opened with fire. These clearings support only two planting seasons in many cases, because burning calcines the forest bacterial flora, depletes nutrient cycling, and collapses soil fertility. The result is a frontier dynamic: once the chagra becomes less productive, a new forest patch is burned. This creates a recurring pattern of small but cumulative deforestation that is ecologically disproportionate because it edges mature forest, invites invasive disturbance, and increases access for timber extraction and mining.

The conservation diagnosis is therefore sequential and systemic. Illegal mining generates the highest direct forest loss and the most dangerous pollution. Illegal timber trafficking selectively degrades high-value ecological structure and expands clandestine access. Fire-based agricultural conversion creates constant frontier expansion and locks families into a cycle of declining productivity. Taken together, these drivers reduce canopy integrity, contaminate soils and wetlands with mercury, lead, copper, and cadmium, compromise regeneration, weaken food security, and tie Tikuna labor to illegal economies. The baseline implication is clear: protecting biodiversity in this zone requires a territorial strategy capable of simultaneously keeping people out of mining

chains, reducing demand for illegal logging, and replacing fire-based expansion with more sustainable livelihoods and stricter community control over access and use.

Table 1. Quantified baseline pressures and ecological implications

Threat driver	Quantified signal in the baseline	Primary ecological impact	Primary social effect	Immediate management implication
Illegal mining	At least 208 illegal points; >600 Tikuna laborers/year; 16,000 ha/year forest loss in the broader landscape; mercury residues >0.93 µg/g	Forest removal, channel alteration, wetland contamination, methylmercury risk	Recruitment into illegal labor, food and water risk, territorial insecurity	River and access surveillance, contamination monitoring, livelihood substitution, restoration and phytoremediation
Illegal timber trafficking	~90 trafficking sources in 4,200 ha; 308 trees cut per month	Selective loss of seed trees, canopy fragmentation, easier access for further incursions	Normalisation of illegal trade and fast extraction income	Seed-tree protection, hotspot surveillance, community sanctions, species watchlists
Forest conversion by fire	32 ha/month opened by fire for cattle and short-cycle agriculture	Soil microbiota collapse, repeated frontier expansion, edge effects	Declining plot fertility and recurring need to clear new land	Fire-reduction agreements, agroforestry transition, demonstration plots, household extension

3. CUSTOMARY GOVERNANCE AND GUIDING PRINCIPLES

This conservation plan is intentionally grounded in Tikuna uses and customs because enforcement that ignores community institutions will fail in a forest where access, movement, knowledge, and social legitimacy are organized through kinship, assemblies, river travel, and locally recognized authority. The plan does not romanticize customary governance or assume that all current practices are automatically conservation-positive. Rather, it starts from a more practical conservation premise: the community already has territorial rules, collective memory, seasonal knowledge, and social mechanisms for sanction and coordination, and those instruments must be strengthened, clarified, and aligned with forest protection if the territory is to resist illegal economies.

Four governance principles guide the plan.

First, collective territorial authority must precede sectoral action. Patrols, restoration, education campaigns, and communication tools are useful only if they are nested within decisions endorsed by the relevant community structures. This means that annual work plans should be validated through assemblies and local leadership bodies, with clear agreements on priority areas, seasonal restrictions, and sanctions for internal complicity with illegal mining, timber trafficking, or unauthorized burning.

Second, conservation zoning must reflect customary use. The plan therefore distinguishes, through participatory mapping, between core conservation areas, restoration areas, family production areas, river and wetland monitoring areas, and access control points. This is crucial because communities are more likely to defend conservation rules that recognize where use is legitimate and where protection must be strict than rules that treat the entire landscape as equally restricted.

Third, women and youth must be recognized as governance actors, not only as beneficiaries. In many Amazonian communities, women sustain seed exchange, food systems, household decision-making, and intergenerational teaching, while youth are the group most exposed to recruitment into illegal extraction networks. A customary conservation system that does not create formal roles for women's participation and youth leadership will reproduce the same labor capture that currently feeds mining and illegal timber trafficking.

Fourth, customary rules need operational tools. A conservation plan based on custom is not a vague appeal to tradition; it must produce visible management instruments. These include locally agreed patrol routes, seasonal no-entry periods, registers of infractions, restoration obligations for degraded plots, river monitoring routines, nursery responsibilities, school engagement calendars, and protocols for reporting illegal incursions to competent institutions without exposing community members unnecessarily.

The plan therefore proposes a governance architecture with three levels. At the territorial level, a community conservation assembly validates priorities, annual targets, and sanctions. At the operational level, a Tikuna Conservation Committee coordinates ranger brigades, restoration, education, communications, and monitoring. At the family level, households adopt basic conservation commitments such as avoiding unauthorized burning, protecting seed trees, participating in nursery or restoration work, and refusing labor recruitment by criminal extraction groups.

This governance approach has a direct conservation advantage: it lowers transaction costs and increases compliance because rules are embedded in socially recognized processes. It also creates the conditions for durability after project cycles end. External support can finance restoration, training, monitoring, and equipment; it cannot permanently substitute for local authority. For that reason, the true long-term infrastructure of the plan is institutional rather than physical. Patrol posts, nurseries, and communication materials matter, but the most important asset is a functioning Tikuna governance system capable of making standing forest socially enforceable.

Table 2. How Tikuna customary governance is translated into operational conservation

Customary or institutional anchor	Conservation implication	Operational expression in the plan
Community assemblies and local leadership	Legitimacy is required before enforcement	Annual approval of conservation priorities, sanctions, and patrol calendars
Differentiated territorial use	Not all spaces should be governed identically	Zoning into core conservation areas, restoration polygons, family production areas, and river protection belts

Women's and youth roles in social reproduction	Conservation durability depends on intergenerational participation	Women-led learning circles, youth stewardship program, minimum participation quotas in brigades and committees
Collective norms and sanctions	Rules must be visible and socially enforceable	Registers of infractions, restoration obligations, and community reporting protocols
River mobility and seasonal knowledge	Surveillance must align with hydrological reality	Seasonal patrol intensification, flood and dry season restoration windows, river monitoring nodes

4. VISION, OBJECTIVES AND SPATIAL MODEL

The 2035 vision of this plan is a Tikuna-managed Amazonian landscape in which 10537 hectares of forest, river corridors, and community-use areas remain ecologically functional, socially governed, and economically defended against illegal mining, illegal timber trafficking, and fire-driven agricultural expansion. In practical conservation terms, that means a territory where forest loss declines, contaminated sites enter recovery, high-value species are protected, youth are employed in legal conservation work rather than extractive labor, and the community possesses the organizational and technical capacity to monitor, communicate, and enforce its own territorial decisions.

The general objective is to conserve and restore the Tikuna planning landscape between 2025 and 2035 through a biocultural strategy that combines customary governance, ranger surveillance, ecological restoration, environmental education, public communication, and sustainable livelihoods. Four specific objectives structure the implementation model:

1. Reduce direct forest degradation and contamination by establishing a permanent community conservation and surveillance system covering core forest, river, and access-control areas.
2. Restore ecologically degraded sites, especially those affected by mining, logging, or fire, through native-species nurseries, phytoremediation, and assisted natural regeneration.
3. Rebuild the social basis of conservation through education, youth leadership, women's participation, and community communication rooted in Tikuna territorial identity.
4. Make conservation economically durable by replacing illegal labor capture with legal, community-based livelihoods tied to restoration, monitoring, agroforestry, and low-impact forest use.

Spatially, the plan organizes the 10537-hectare landscape into five management categories. Core conservation areas are mature forest sectors and sensitive habitats where extraction and conversion are prohibited and ranger presence is prioritized. Restoration areas are zones already degraded by fire, selective extraction, or mining, where soil rehabilitation and planting are required. Community production areas are family-use spaces where agroforestry and fire-free production practices are promoted under agreed rules. River and wetland protection areas include banks, tributaries, and flood-prone zones critical to water quality and contamination control. Access and surveillance nodes are the trails, river entry points, and strategic crossings where community monitoring can detect illegal movements early.

This spatial model matters because different threats operate differently across the landscape. Mining concentrates in riverine or accessible sectors with machinery routes and pump sites. Illegal timber trafficking

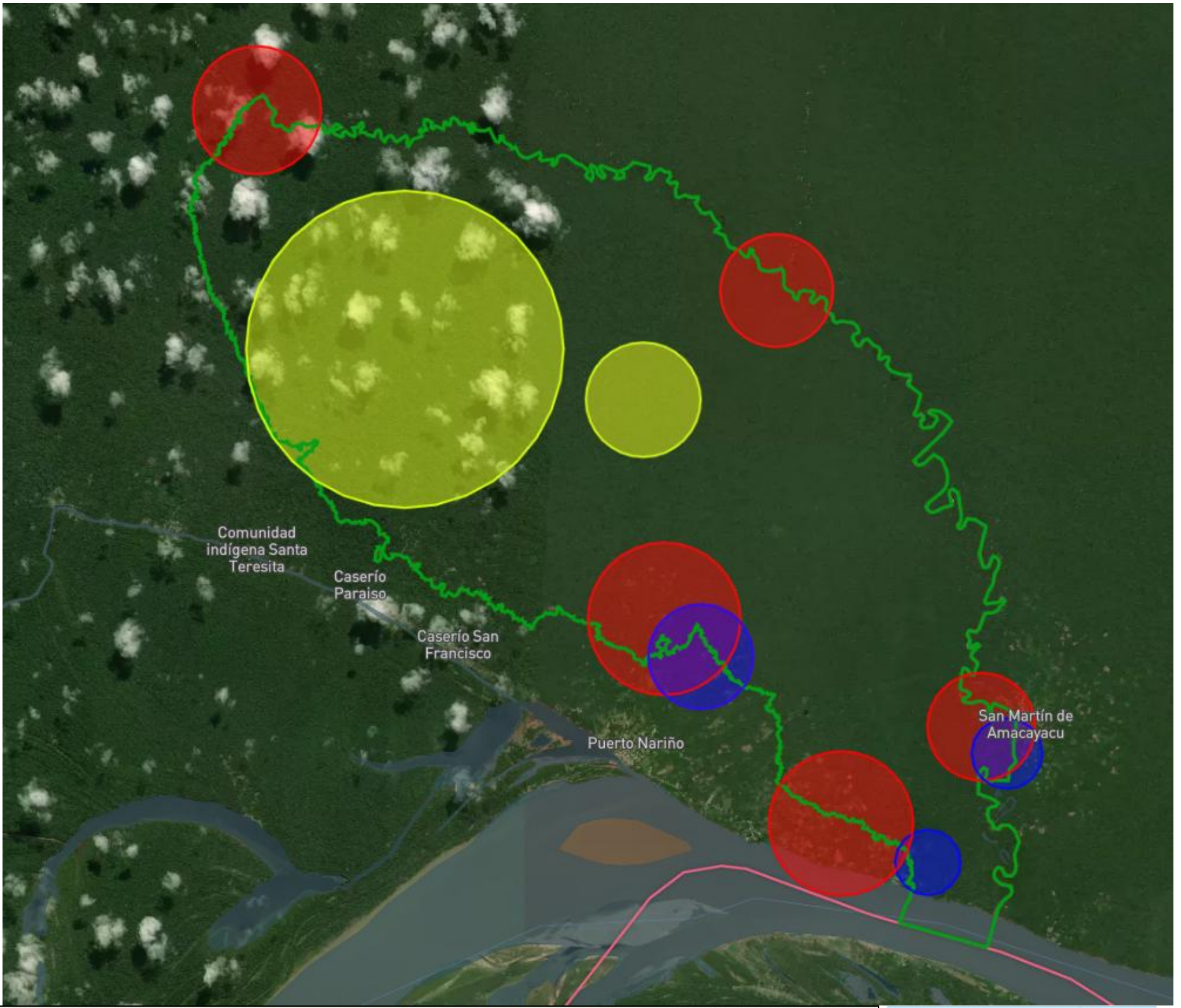
depends on access corridors and hidden storage zones. Fire-based agricultural expansion tends to move outward from existing family plots. Treating all hectares identically would therefore waste scarce community effort. The spatial model allows differentiated management: strict control in core areas, rapid restoration in priority degraded zones, and productive transition in family-use areas where destructive practices can realistically be replaced.

The plan's theory of change is simple but robust. If Tikuna authority controls access, if youth and women lead visible conservation roles, if degraded land is restored with economically useful native species, and if the community can communicate and monitor forest change on its own terms, then the opportunity space for illegal extraction shrinks and the relative value of standing forest increases. The result is not only lower pressure in ecological terms; it is a reordering of labor, legitimacy, and local aspiration toward conservation.

Table 3. Strategic targets for 2026, 2030 and 2035

Strategic line	2026 milestone	2030 milestone	2035 target
Community conservation governance	Plan validated; zoning completed; conservation committee operating	Annual review cycle institutionalized	Permanent community governance over the full 10537 ha planning landscape
Ranger surveillance	6 brigades deployed; baseline patrol routes active	12 brigades fully operational	Permanent 12-brigade network with rotation and incident records
Restoration and phytoremediation	3 nurseries operating; first 150 ha restored	800 ha under restoration or assisted regeneration	1,500 ha restored, including contaminated and fire-degraded sites
Youth and environmental education	First 60 youth trained; school cycles initiated	180 youth trained; repeated school field modules active	300 trained youth stewards and long-cycle school engagement
Fire-free or low-fire production transition	50 family plots in transition	200 plots under agreements	350 plots under fire-reduction or fire-free management
Monitoring and evidence	20 monitoring points established	Annual State of the Forest and Rivers briefs consolidated	Ten-year dataset on forest pressure, restoration, and contamination

11. PROJECT MAP



TIKUNA TERRITORIAL FOREST CONSERVATION PLAN

	Project area
	Climate-related Forest fire zones
	Deforested areas with degraded soils
	TIKUNA indigenous settlements

SCALE

1cm = 1,000 meter

SOURCES

- Environmental Women ORG
- Google Maps

- **Country:** COLOMBIA
- **Departments:** Amazon
- **Cities:** Puerto Nariño
- 9800 hectares of TIKUNA indigenous territory
- **Geographic coordinates: 3°47'58.8"S 70°17'52.3"W**

5. TECHNICAL CONSERVATION STRATEGY

The technical conservation strategy is the operational core of the 2025-2035 plan. It translates diagnosis and customary authority into field actions that can be organized, measured, and improved over time. The strategy has six lines of work that should be implemented simultaneously because each one addresses a different ecological stage of the degradation cycle.

A. Community natural areas and conservation zoning. During the first phase of the plan, the Tikuna community will complete a participatory zoning exercise to identify core conservation areas, restoration polygons, family production areas, river protection belts, and strategic access points. This is not a purely cartographic exercise; it is the basis for rules. Core conservation areas must include old-growth forest, river-edge habitats vulnerable to contamination, and sectors where illegal logging or mining access has already been documented. Community agreements should define what is prohibited, what is seasonal, and what can be done only under collective authorization. By 2027, the plan should have a formal community conservation map for the full 10537 hectares, updated every two years.

B. Tikuna ranger brigades. The plan proposes a permanent network of 12 community ranger brigades composed of 48 trained members, with balanced participation of youth and adults and at least 40 percent women across the full structure. Brigades should operate in rotation, with patrol calendars that intensify in dry periods, known mining windows, and timber extraction seasons. Their tasks include forest transects, river surveillance, photographic evidence collection, access-point observation, marking of degraded sites, and early warning to local authorities and partner institutions. Each brigade should receive basic equipment: boots, rain gear, GPS-enabled devices or phones, notebooks, first-aid kits, communication tools, and river mobility support where needed. The objective is not militarization; it is rapid community detection and social deterrence.

C. Restoration, assisted natural regeneration, and phytoremediation. The plan establishes a target of restoring 1,500 hectares by 2035 through a combination of assisted natural regeneration, enrichment planting, riparian recovery, and phytoremediation in contaminated zones. Restoration should prioritize mining scars, fire-degraded fronts, timber extraction gaps, and river edges at risk of erosion or contamination. A network of three community nurseries should produce at least 180,000 native seedlings over ten years, averaging 18,000 seedlings annually. Species selection should combine ecological function and cultural utility, including timber, fruit, shade, and riparian stabilizers. In zones with mercury, lead, copper, or cadmium contamination, the plan will integrate the results of the Environmental Women Org study on five native tree species with phytoremediation potential, using them in controlled rehabilitation plots that are monitored for survival, canopy closure, and reduction of visible erosion or sediment runoff.

D. River, wetland, and soil monitoring. Because mining contamination moves through aquatic systems, the technical strategy cannot focus only on canopy cover. The plan proposes a community environmental monitoring protocol with seasonal sampling of soils and selected water points in high-risk zones, using partnerships with universities and laboratories when specialized analysis is needed. A minimum of 20 monitoring points should be established by 2026 and maintained throughout the plan. Community members will collect field observations on turbidity, sediment disturbance, visible fuel residues, channel alteration, and illegal machinery traces, while periodic laboratory partnerships will assess mercury and other heavy metals. This evidence base is essential for both conservation decisions and external advocacy.

E. Anti-trafficking control for illegal timber and wildlife extraction. Although timber is the most documented biodiversity-trafficking pressure in the current diagnosis, the surveillance system will also record other illegal wildlife extraction signals when present. The conservation response includes mapping of known storage zones, protection of seed trees and mother trees of threatened species, rapid reporting of fresh stumps and new extraction routes, and community agreements that prohibit sale to illegal intermediaries. Each year, brigades and local leaders should update an internal watchlist of priority species and extraction hotspots, with special focus on rosewood, cedar, mahogany, and sapan.

F. Fire prevention and productive transition. In family production zones, the plan will progressively replace uncontrolled burning with fire-free agroforestry and improved soil management. Demonstration plots will show how organic matter recovery, mixed planting, shade trees, and low-impact clearing can sustain production without repeated frontier expansion. By 2030, at least 200 family plots should be under fire-reduction agreements; by 2035, the target rises to 350 plots.

The success of this technical strategy depends on integration. Patrols identify degraded sites. Monitoring prioritizes restoration. Nurseries supply plants. Zoning defines where work occurs. Family transition reduces repeated damage. When these components operate together, they create an enforceable conservation system rather than a set of isolated environmental activities.

1. Community forest transect

2. River corridor

3. Native-species nursery

4. School-based mobilization

Photo plate: community images supplied by Environmental Women Org

Figure 3. Community photo plate used in the plan: forest transect, river corridor, native-species nursery, and school-based mobilisation.

6. EDUCATION STRATEGY

The education strategy of the Tikuna Conservation Plan is designed as a long-term territorial pedagogy rather than a short sequence of workshops. Its purpose is to change the social reproduction of environmental harm by ensuring that children, adolescents, youth, women, and household decision-makers understand the ecological consequences of mining, timber trafficking, and fire-based frontier expansion, while also seeing conservation as a source of identity, skills, and livelihood. In a context where illegal economies recruit labor by offering immediate cash, environmental education must be practical, intergenerational, and publicly visible.

The strategy is organized in four educational pathways.

1. School-based forest education. Local schools in the target landscape will be supported with a Tikuna-centered conservation curriculum that links Amazon ecology, river health, forest species identification, mercury risks, restoration, territorial mapping, and community monitoring. Rather than importing a generic biodiversity syllabus, the program will use local examples: mining pits as contamination sources, seed trees of high-value timber species, river-edge erosion, and the role of nurseries in rebuilding degraded land. Each year, schools should conduct at least two learning cycles: one in classrooms and one in the territory, including river walks, nursery practice, or forest observation. By 2035, the goal is that all children in participating schools complete repeated place-based conservation learning experiences, not just one-off awareness sessions.

2. Youth stewardship and technical formation. Young people are central to the plan because they are both the group most likely to be recruited into illegal extractive labor and the group best positioned to adopt monitoring, mapping, restoration, and communication tools. A Tikuna Youth Stewardship Program will train at least 30 young people each year in forest transects, GPS use, basic environmental recording, native plant propagation, contamination risk communication, and public speaking. Over ten years, this will create a pool of 300 trained youth conservation actors. The program should be certified informally or formally where possible, so that participation has labor value and social prestige.

3. Women’s knowledge and family learning. Women’s participation in conservation is frequently underestimated because environmental programs are often designed around patrols and external meetings. This plan takes a broader view. Women are crucial to seed selection, medicinal knowledge, food security, household decision-making, and intergenerational teaching. The education strategy therefore includes women-led learning circles on native species, non-timber products, safe food and water in contaminated environments, low-burn or fire-free family production, and community rules for protecting restoration sites. These circles will also help ensure that sustainability measures do not exclude women from the benefits of the plan.

4. Community pedagogies through assemblies and demonstration sites. Conservation learning must also happen in public. For that reason, nurseries, restoration plots, and community mapping sessions will function as demonstration spaces where ecological processes are explained in relation to visible problems and visible solutions. A degraded site under restoration is more convincing than a lecture; a community map of access routes is more useful than an abstract warning about illegality.

Methodologically, the education strategy will use short modules, visual tools, peer teaching, field notebooks, storytelling, and practical tasks rather than lecture-heavy formats. At least eight community education events

should occur each year, alongside school cycles and youth training modules. Learning will be evaluated not only through attendance, but through behavioral indicators: seedling care, reporting of illegal activities, household adoption of fire-reduction measures, participation in assemblies, and youth retention in legal conservation roles. The measure of success is simple: education must produce better forest decisions in real territory, not just better vocabulary.

Table 4. Education architecture

Audience	Core content	Annual intensity	2035 cumulative ambition
Children and schools	Forest ecology, mercury risk, nursery practice, local species, river observation	At least 2 learning cycles per year per participating school	Repeated place-based education for all children reached by the plan
Youth	Patrol basics, mapping, restoration, public speaking, environmental records	30 youth trained each year	300 trained youth conservation actors by 2035
Women and family caregivers	Seed knowledge, safe food and water, low-fire production, medicinal and non-timber species	4 women-led learning circles per year	Permanent women's participation in local conservation governance and livelihoods
Whole community	Assemblies, demonstration plots, public campaigns, photo and map exhibitions	At least 8 public education events per year	Conservation message normalized across territory

7. COMMUNICATION STRATEGY

The communication strategy is designed to make conservation visible, understandable, and socially legitimate across the Tikuna territory and its surrounding institutional environment. In landscapes dominated by illegal extraction, silence benefits traffickers. Criminal economies rely on secrecy, fragmentation, and the normalization of environmental damage. A conservation plan therefore needs a communication system that does three things at once: it must inform, it must mobilize, and it must protect community legitimacy.

The first communication objective is internal cohesion. Families must repeatedly hear and see the same territorial message: standing forest protects food, water, health, and future autonomy, while mining, illegal timber trafficking, and uncontrolled burning produce contamination, debt, and long-term loss. To achieve this, the plan will use community assemblies, school events, noticeboards, illustrated posters, restoration-site signage, and periodic visual bulletins. Materials should prioritize clarity over technical density and use locally recognizable examples: a contaminated wetland, a missing seed tree, a burned plot that lost fertility after two cycles. Where possible, key terms should be translated or explained through Tikuna linguistic and cultural references so that communication reinforces identity rather than replacing it.

The second objective is rapid territorial information flow. Ranger brigades, nursery teams, teachers, youth stewards, and community leaders all generate information relevant to conservation: new stumps, unusual river

turbidity, machinery sounds, recent burns, nursery production data, or attendance at education events. The communication strategy will organize this into a simple multi-channel system using phone messaging where connectivity allows, written logbooks where it does not, and scheduled reporting moments in assemblies or committee meetings. The goal is not technological sophistication; it is timely circulation of actionable information.

The third objective is external visibility and advocacy. The Tikuna territory cannot confront illegal extraction networks in isolation. The communication plan therefore includes a curated external narrative addressed to municipal authorities, environmental agencies, partner universities, civil society organizations, and potential allies. This narrative should present evidence of forest pressure, community response, restoration results, and social impacts in a disciplined way. It should avoid sensationalism while making clear that the area is of international conservation importance and that Tikuna families are already investing labor and governance in its defense.

Three communication products will anchor the strategy: an annual State of the Forest and Rivers brief prepared in accessible language; a community photo and map archive that documents change over time; and a youth-led campaign calendar linked to forest, water, school, and cultural dates. Environmental Women Org can support the editorial and design side, but the public face of the strategy should be community-based. The most persuasive message is not that an outside organization has a project; it is that Tikuna society has a territorial plan and is already implementing it.

By 2035, the communication strategy should produce a visible shift in public discourse. Illegal mining should no longer appear as an inevitable employer. Illegal logging should no longer appear as a normal side activity. Burning should no longer appear as the only way to open productive land. Instead, the dominant story should be that the territory has rules, evidence, alternatives, and people willing to defend them. In conservation practice, that narrative shift is not cosmetic. It changes behavior.

Table 5. Communication matrix

Objective	Primary channels	Lead messengers	Expected result
Internal cohesion around forest rules	Assemblies, posters, school events, restoration-site signage	Community leaders, teachers, youth stewards	Shared social legitimacy for conservation rules
Rapid flow of territorial alerts	Messaging groups where possible, logbooks, scheduled oral reporting	Ranger brigades and committee members	Timelier detection of illegal access, burns, or contamination signals
External advocacy	Annual briefs, photo-map archive, partner meetings	Environmental Women Org and Tikuna representatives	Improved institutional response and visibility of community conservation
Youth mobilisation	Calendar-linked campaigns, public events, school participation	Youth stewardship network	Conservation becomes aspirational and public

8. SUSTAINABILITY STRATEGY

Sustainability is the decisive test of this conservation plan. The Tikuna territory will not remain protected merely because a ten-year document exists or because community brigades are trained once. The plan will only endure if it changes the material incentives that currently draw labor into illegal mining, timber trafficking, and destructive frontier expansion. For that reason, sustainability is not a final chapter added after conservation activities; it is the economic and institutional architecture that makes all other chapters viable.

The sustainability strategy has four components.

1. Conservation employment and local service provision. Restoration, nursery management, patrols, mapping, environmental monitoring, and education all require labor. The plan will treat these not as volunteer add-ons but as a local employment platform. Community members, especially youth and women, should be paid or incentivized when resources allow to produce seedlings, maintain restoration sites, participate in ranger shifts, and collect environmental data. Over time, the territory should build a recognized cadre of local conservation workers whose skills are more valuable than temporary work in illegal extraction circuits. This is one of the strongest levers for withdrawing Tikuna labor from mining.

2. Fire-free agroforestry and productive transition. Families need legal income and food security. The plan therefore proposes a shift from repeated burning and short-cycle cropping toward agroforestry systems that maintain soil cover, diversify production, and reduce the need to open new forest fronts. Priority systems should combine food crops, shade, fruit trees, timber trees for long-term household value, and soil improvement practices. Demonstration plots will function as both learning and production units. By 2035, the objective is to consolidate at least 350 family plots under fire-reduction or fire-free management rules, with measurable gains in soil stability and a decline in new forest clearing pressure.

3. Forest-compatible value chains. The plan will promote livelihoods that depend on keeping forest standing rather than liquidating it. These may include native-seed collection, nursery sales and seedling supply for restoration, legal non-timber forest products, medicinal plant cultivation, handicrafts linked to sustainable raw materials, low-impact ecotourism, and community monitoring services for partner institutions. Not every household will join the same livelihood line, but the portfolio must be broad enough to reduce dependence on one extractive alternative. The key criterion is ecological compatibility: any enterprise supported under the plan must maintain or increase forest cover and must not incentivize harvest of threatened species.

4. Institutional durability and co-financing. A conservation plan of this scale requires long-term partnerships. Environmental Women Org will support design, facilitation, training, and alliance-building, but the community will need recurring links with schools, local government, environmental authorities, research institutions, and funding partners. Sustainability therefore includes institutional tasks: annual results reporting, evidence-based advocacy, agreements for laboratory support on contamination monitoring, and joint fundraising for restoration and youth stewardship. The long-term goal is a diversified support base so that no single donor or organization becomes the only pillar of continuity.

From a conservation economics perspective, the plan seeks to transform the relative attractiveness of land uses. Today, mining offers immediate cash but leaves mercury, eroded channels, and criminal dependency. Illegal logging offers quick transactions but removes seed trees and invites recurrent incursions. Burning opens land cheaply but rapidly destroys fertility. The sustainability model proposed here creates a different value structure: conserved forest yields social legitimacy, employment in restoration and monitoring, diversified family production, educational continuity, and access to lawful partnerships. This transformation is gradual, but it is

realistic. In remote forest landscapes, conservation lasts when the standing forest begins to generate more secure and socially approved opportunity than the illegal alternative.

Table 6. Sustainability portfolio

Livelihood or institutional line	Forest benefit	Social benefit	Enabling action in the plan
Nursery production and restoration labor	Native seedlings for degraded sites; faster recovery of canopy and soil	Local paid work, especially for youth and women	Three nurseries, restoration contracts, species propagation training
Community monitoring services	Regular evidence on forest loss, rivers, and contamination	Technical skills and territorial employment	Ranger brigades, monitoring points, reporting tools
Fire-free agroforestry	Lower need to clear new forest; improved soil cover	Food security and more stable family production	Demonstration plots, extension, fire-reduction agreements
Non-timber forest products and medicinal species	Standing forest becomes productive without being liquidated	Diversified household income and cultural continuity	Species selection, women-led learning circles, market scoping
Low-impact ecotourism and territorial interpretation	Creates value for intact forest and river scenery	Community revenue and public visibility	Training, signage, guiding narratives, alliance building
Institutional co-financing	Continuity of monitoring, education, and restoration	Lower dependence on a single funding source	Annual reporting, evidence briefs, partner engagement

9. IMPLEMENTATION ARRANGEMENT AND SCHEDULE

The plan covers the period 2025-2035 and is structured in four phases, each with distinct priorities and outputs, but all of them connected through continuous governance and monitoring.

Phase I, 2025-2026: Organization and baseline consolidation. During the first two years, the priority is to establish the governance and evidence base required for durable action. This includes approval of the plan through community structures, participatory zoning of the 10537-hectare landscape, creation of the Tikuna Conservation Committee, recruitment and training of the first ranger brigades, setup of nursery infrastructure, and establishment of baseline monitoring points for forest pressure and contamination. By the end of 2026, the plan should already have a functioning conservation map, a community rule set, at least 20 environmental monitoring points, three nurseries in operation, and a first annual State of the Forest and Rivers brief.

Phase II, 2027-2029: Intensive field deployment. This is the period of strongest territorial action. Brigades operate regularly, restoration begins in priority degraded sites, schools and youth programs scale up, and family transition efforts toward fire-free or low-fire production take shape. Communication materials become routine,

and public visibility of the plan increases. By 2029, restoration should cover at least 600 hectares, all 12 brigades should be operational, 150 youth should have completed stewardship training, and at least 150 family plots should be engaged in production-transition agreements.

Phase III, 2030-2032: Consolidation and productive transition. Once the conservation system is functioning, the plan deepens its sustainability logic. Restoration expands, contaminated sites enter longer-term recovery, nurseries support both ecological and livelihood objectives, and the portfolio of legal forest-compatible income sources becomes more structured. This phase also prioritizes stronger external alliances for laboratory monitoring, legal support, and co-financing. By 2032, the plan aims to have 1,100 hectares under restoration, 250 families adopting improved productive practices, and a clearly documented reduction in new burning and new illegal logging signs in priority sectors.

Phase IV, 2033-2035: Institutionalization and handover to long-cycle community governance. The final phase focuses on locking in gains. Governance procedures are standardized, monitoring series are consolidated into a ten-year evidence base, youth leaders transition into stable community roles, and sustainability mechanisms are reviewed for continuity beyond 2035. The final objective is not to end conservation action, but to ensure that the system is no longer dependent on an initial organizing push.

Implementation roles are distributed across three actors. Environmental Women Org provides technical design, facilitation, coordination, and alliance management. The Tikuna community provides territorial authority, field labor, customary legitimacy, and community decision-making. Partner institutions such as schools, laboratories, and universities support education, analysis, and co-learning. This distribution is intentional: it prevents over-centralization and ensures that implementation remains territorially grounded.

Operationally, each year should conclude with a short adaptive planning cycle in which results are reviewed, risk maps updated, and the following year's targets adjusted. A rigid ten-year plan that cannot learn will fail. The schedule therefore combines long-term direction with annual flexibility.

Table 7. Phased implementation schedule

Phase	Years	Operational emphasis	Selected milestones
Phase I	2025-2026	Governance setup, zoning, baseline, training, nursery installation	Plan validated; conservation map completed; 20 monitoring points; first brigades and nurseries active
Phase II	2027-2029	Intensive patrols, restoration deployment, education scale-up, communication visibility	12 brigades operational; 600 ha restored; 150 youth trained; 150 family plots in transition
Phase III	2030-2032	Consolidation, livelihood transition, stronger partnerships, contaminated-site recovery	1,100 ha restored; 250 family plots under improved management; stable annual public reporting
Phase IV	2033-2035	Institutionalization, dataset consolidation, long-cycle governance continuity	1,500 ha restored; 300 youth trained; 350 family plots in fire-reduction system; permanent governance

10. MONITORING, EVALUATION AND ADAPTIVE MANAGEMENT

Monitoring and evaluation are not bureaucratic appendices in this plan; they are the method by which conservation action remains credible over ten years. In a territory affected by illegal extraction and contamination, evidence is required for three reasons. First, the community needs to know whether its own effort is producing ecological and social results. Second, external allies and institutions require defensible information before mobilizing support or enforcement. Third, a ten-year plan must learn from changing conditions rather than assuming that the baseline remains constant.

The monitoring system will combine community observation, georeferenced field records, photographic documentation, nursery and restoration logs, and periodic external analysis where technically required. Indicators are organized into five families.

1. Forest integrity indicators. These include hectares under agreed conservation management; number and location of new burns detected; number of fresh logging signs recorded; canopy recovery in restoration plots; number of protected seed trees mapped; and area of degraded sites entering assisted regeneration or planting. The reference baseline includes 16,000 hectares of forest affected annually by mining in the broader landscape, 308 illegally extracted trees per month in 4,200 hectares, and 32 hectares per month converted by fire-based agricultural expansion. While the plan may not control all external drivers, it should demonstrate reduction trends inside priority intervention sectors.

2. Contamination and water indicators. These include number of active environmental monitoring points; frequency of field records on turbidity and channel alteration; number of sites sampled for soils and water; and trends in mercury or other heavy-metal indicators where laboratory analyses are available. The critical reference point is the current documentation of mercury values above 0.93 micrograms per gram, exceeding the 0.3 micrograms per gram critical threshold.

3. Governance indicators. These include number of community assemblies validating annual conservation decisions; ranger brigade deployment frequency; compliance with patrol calendars; number of recorded infractions and community responses; and participation of women and youth in decision-making roles. If governance weakens, conservation outputs will eventually weaken as well, so these indicators are treated as ecological precursors, not only social metrics.

4. Education and communication indicators. These include number of school learning cycles completed, youth trained, women’s learning circles held, community education events conducted, communication materials distributed, and annual public reports produced. The key question is whether conservation knowledge is circulating through institutions and households rather than remaining confined to project staff.

5. Sustainability indicators. These include number of operational nurseries, number of seedlings produced and surviving after planting, number of family plots under fire-reduction or agroforestry agreements, number of community members receiving legal income through conservation-related activities, and number of active external partnerships supporting the plan.

Evaluation will occur annually and at the end of each phase. However, the most important management rule is adaptive use of evidence. If a patrol route stops detecting new incursions because the threat moved elsewhere, the route must change. If a restoration species fails repeatedly on a contaminated site, the species mix must be revised. If a communication channel does not reach youth, the format must change. In other words, the plan values consistency of purpose, not rigidity of method.

By 2035, the monitoring system should yield a ten-year territorial dataset on forest pressure, restoration, contamination risk, community action, and social transition. That evidence will be one of the plan's most strategic products because it converts local experience into a permanent conservation asset.

Table 8. Core indicator framework

Indicator	Baseline reference	2030 milestone	2035 ambition	Verification source
Hectares under community conservation management	0 ha under this formal plan structure	10537 ha zoned and annually reviewed	10537 ha under mature community management cycle	Community maps, assembly records, annual plan reviews
Operational ranger brigades	0 formal brigades under this plan	12 brigades in rotation	12 permanent brigades with regular patrol logs	Patrol books, GPS tracks, committee reports
Hectares restored or under assisted regeneration	0 ha under this ten-year plan	800 ha	1,500 ha	Restoration registers, photographs, survival counts
Youth trained in stewardship	0 under the plan	180 youth	300 youth	Training attendance, practice records, certification lists
Family plots in fire-reduction transition	0 under plan agreements	200 plots	350 plots	Household agreements, field verification
Environmental monitoring points active	0 formal points under the plan	20 points maintained	20 points maintained with long series	Monitoring sheets, lab reports, geo-referenced records
Annual public conservation briefs	0	1 per year from 2026 onward	10-year evidence archive completed	Published briefs, community archives

11. RISK MANAGEMENT

A realistic conservation plan for the Tikuna territory must recognize that implementation will face serious risks. The most obvious is retaliation or obstruction from illegal extraction networks. Mining and timber trafficking are profitable precisely because they operate in remote forest settings with weak oversight. As community surveillance becomes stronger, these networks may change routes, attempt co-optation, spread misinformation, or intimidate local actors. The response is not confrontation for its own sake. It is careful operational security: brigade protocols, collective rather than individual reporting, evidence handling rules, and alliance-building with legitimate institutions that can respond to documented incursions.

A second risk is social dependence on extractive income. Even when the ecological harm is obvious, families may still rely on illegal labor because alternatives are weak or delayed. This is why the sustainability strategy is

inseparable from enforcement. If conservation only prohibits and does not create legal opportunity, compliance will erode. Early wins in nursery employment, restoration contracts, youth stipends, or improved family production are therefore risk-mitigation measures, not merely benefits.

A third risk is climate variability. Floods can destroy nurseries and restoration plots; drought can increase fire risk and seedling mortality. To reduce this vulnerability, the plan staggers planting seasons, uses native species adapted to local moisture regimes, protects nursery infrastructure, and maintains a restoration calendar linked to hydrological cycles rather than fixed administrative dates.

A fourth risk is institutional discontinuity. Leadership changes, project fatigue, or weak coordination between community and external partners can slow implementation. The mitigation strategy is procedural rather than personal: written annual agreements, transparent reporting, repeated assembly validation, and distributed roles so that no single person becomes an irreplaceable node.

A fifth risk is contamination beyond local control. Even if the community reduces internal participation in illegal mining, mercury already released into soils and wetlands will persist. The plan therefore treats contamination recovery as a long-duration process requiring both ecological remediation and continued exposure awareness.

Risk management in this plan is not separate from conservation practice. Patrols reduce access risk. Education reduces recruitment risk. Communication reduces misinformation risk. Sustainable livelihoods reduce economic relapse risk. Monitoring reduces uncertainty. Governance reduces fragmentation. A ten-year plan becomes resilient when its daily actions are themselves forms of prevention.

Table 9. Risk matrix

Risk	Probability	Potential effect	Mitigation built into the plan
Retaliation or obstruction by illegal networks	High	Reduced reporting, intimidation, route displacement	Collective reporting, alliance with institutions, rotating patrols, careful evidence protocols
Household dependence on extractive income	High	Relapse into mining or illegal logging labor	Early livelihood substitution, paid conservation work, agroforestry transition
Floods, droughts or climatic shocks	Medium to high	Nursery loss, seedling mortality, higher fire risk	Seasonal planning, protected nurseries, native species mix, staggered planting
Institutional turnover or coordination failure	Medium	Interrupted implementation and weak follow-through	Written annual agreements, distributed roles, transparent reporting
Persistent contamination legacy	High	Slow ecological recovery and continued exposure concerns	Long-term monitoring, phytoremediation, awareness measures, riparian rehabilitation

12. CONCLUSION

The Tikuna Conservation Plan 2025-2035 is built on a straightforward but urgent conservation truth: one cannot protect a globally important Amazon forest by treating mining, timber trafficking, and forest conversion as disconnected problems. In the Puerto Nariño landscape, these pressures feed on one another and draw strength from the same weaknesses - fragmented monitoring, undervalued customary governance, lack of legal income, and the invisibility of ecological damage until it is already advanced. The plan answers that reality with an equally integrated response.

Its novelty lies in coupling technical conservation with Tikuna territorial governance. Ranger brigades without assemblies would not last. Nurseries without livelihoods would not compete with mining. Education without public communication would not change behavior. Monitoring without restoration would only document decline. This plan puts those elements together in a single territorial system designed to keep forest standing, recover damaged areas, protect rivers and wetlands, and ensure that the community has both the authority and the practical means to govern conservation over time.

By 2035, success will not be measured only by hectares planted or meetings held. It will be measured by whether the Tikuna territory is harder to invade, less dependent on criminal extraction, ecologically more connected, and socially more confident in defending its own forest future. That is the standard this plan sets for itself, and it is the reason the plan deserves long-term commitment.

Annex 1. Baseline Tables

Table 10. Baseline numerical references used by the plan

Baseline variable	Value used in the plan	Interpretation for management
Planning landscape	10537 hectares	Scale for zoning, governance, surveillance, and restoration
Illegal mining sources	At least 208 points	Requires access control and river monitoring
Tikuna labor recruited into mining	More than 600 people/year	Conservation must include livelihood substitution
Forest loss associated with mining in the broader intervention landscape	16,000 hectares/year	Mining is the dominant large-scale deforestation engine
Soil mercury concentration documented in affected sites	>0.93 µg/g	Exceeds 0.3 µg/g risk reference; justifies phytoremediation and contamination monitoring
Illegal timber trafficking sources	Approximately 90 sources in 4,200 hectares	Selective extraction requires hotspot-based surveillance
Trees illegally cut	Around 308 trees/month	Urgent protection of seed trees and trade-control measures needed
Forest opened with fire for agriculture and cattle	32 hectares/month	Family production transition must be a major conservation line

Table 11. Native species and ecological functions to be prioritised in nurseries and restoration planning

Functional group	Examples or planning criteria	Intended use in restoration
Phytoremediation candidates	Native species previously assessed in the Environmental Women Org phytoremediation study	Stabilisation of mining scars and contaminated soils
Riparian stabilisers	Fast-establishing native species with root systems suited to river edges	Bank protection and sediment control
Long-cycle seed trees	Species with high ecological and cultural value such as cedar, mahogany, rosewood, and sapan where locally appropriate and legally viable	Recovery of structural diversity and seed sources
Food and fauna-support species	Native fruiting or nectar-bearing species	Support for fauna, family use, and multifunctional restoration
Agroforestry support trees	Shade, nitrogen-fixing, or soil-improving species appropriate to family plots	Reduce burning pressure and improve long-term productivity

Annex 2. Photo Plate and Mapping Note

The map and photographs incorporated into this document were supplied by Environmental Women Org for planning purposes. The KML geometry was used to generate a clean planning map showing the outer landscape boundary and the set of priority intervention polygons. The photographs document community meetings, forest transects, nurseries, schools, river corridors, and other territorial spaces that give the plan its operational and social grounding.

Figure 4. Additional photo plate for annex use.

References and planning inputs

- Environmental Women Org. Phytoremediation Effect of Five Native Tree Species from Soils Contaminated with Heavy Metals in the Colombian Amazon.
- Environmental Women Org. Uploaded KML planning geometry for the Tikuna territorial landscape, Puerto Nariño.
- Environmental Women Org. Community photo archive supplied for this plan.
- Tikuna Indigenous community portal supplied by the requesting organization.
- Community and organizational problem statement supplied for drafting this 2025-2035 plan.