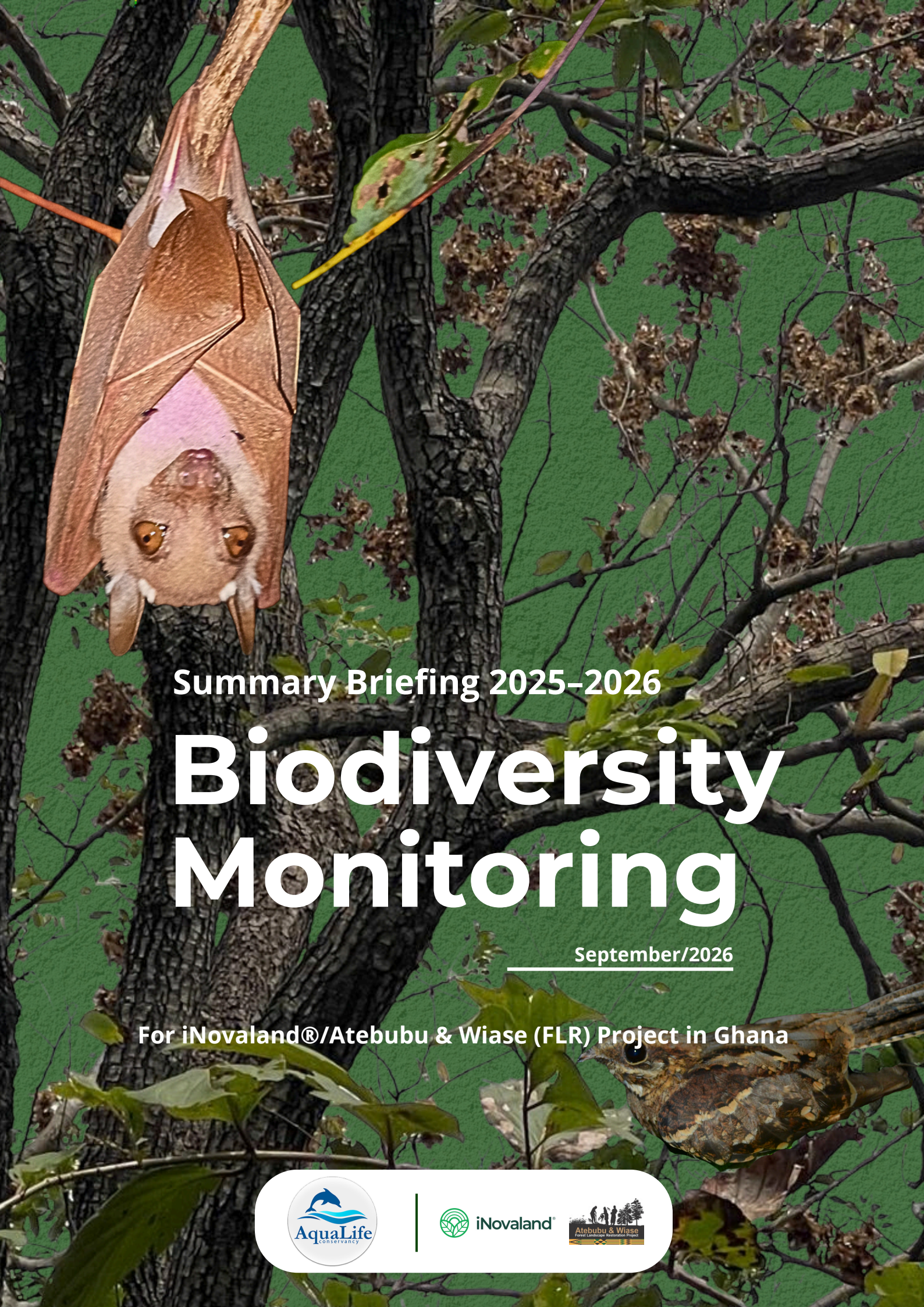


Summary Briefing 2025–2026

Biodiversity Monitoring

September/2026

For iNovaland®/Atebubu & Wiase (FLR) Project in Ghana

AquaLife conservancy | iNovaland® | Atebubu & Wiase Forest Landscape Restoration Project

1. NON-TECHNICAL SUMMARY

The Atebubu-Wiase Forest Landscape Restoration project's goal is to restore and sustainably manage land across two components in the Bono East Region, between Atebubu and Kwame Danso, covering around 15,000 hectares in total.

- Natural forest restoration: restoring around 10,000 hectares of degraded forest.
- Agroforestry and sustainable agriculture: supporting around 5,000 hectares of smallholder farms to improve food and fruit production.

This biodiversity monitoring survey focuses mainly on the natural forest restoration component. It also takes in an existing Eucalyptus plantation established in 2012, before the project began and outside its boundaries, included only as a point of comparison. Since 2024, independent researchers have monitored how wildlife on the site is responding to restoration, comparing a 2024 baseline against a full year of fieldwork carried out across the 2025 wet season and the 2026 dry season. The site includes six constructed water bodies, referred to throughout as dams, which support much of its aquatic wildlife, including its crocodile population.

OVERVIEW

Wildlife in the planted areas is, on the whole, more abundant and more diverse than it was in 2024. Frog species recorded rose from 12 to 20, bat species more than doubled from 7 to 16, and birds went from 132 to 157 species. The monitoring also confirmed its importance for two flagship species, a possible new bat species to science and one of the most significant known populations of the West African crocodile in Ghana.

Some trends move in a different direction. More species were found overall, even though fewer individual birds were counted, and the mammal species list was shorter than in 2024. These changes may reflect restoration, natural year-to-year variation, or both. Five years or more of consistent monitoring will make the cause clear.

WHAT IS GOING WELL

- Frogs, bats, and birds have all gained species since 2024, and no species recorded at baseline has since disappeared.
- The Natural Forest area shows the healthiest overall pattern of tree regeneration of the three habitat types monitored.
- Crocodile hatchling numbers are up, a sign the population at the dams is breeding successfully.
- A newly planted area is already showing the highest bat diversity of any habitat monitored, ahead of older natural forest areas.

WHAT NEEDS ATTENTION

- Young trees of the most valuable native species, including rosewood, mahogany, and shea, are struggling to establish from seed. Only three of the tracked native species showed any seedlings at all, and only in small numbers. The cause is not yet established; in the natural forest specifically, competition from grass, fire, and grazing is a known constraint. This is addressed in the management recommendations.
- Overall species diversity of birds increased, although the number of birds fell by a third. The presence of aerial bird traps was noted in several locations, a poaching pressure that needs additional enforcement.
- A first-ever baseline for soil life (soil animals and microbes) has been completed, but there is not yet a second data point to compare it against.





Laephotis

2. WHAT HAS CHANGED SINCE THE 2024 SURVEY

Throughout this section, "2024" refers to the original baseline survey, and "2025–2026" refers to the current monitoring round, which spans the 2025 wet season and dry-season fieldwork completed in March 2026.

The two surveys were not run on a matched schedule. For several taxa, including crocodiles and dragonflies, the 2024 baseline was a single wet-season survey, while the 2025–2026 monitoring round combined wet-season fieldwork with a separate dry-season survey. Season and time of day affect the activity and visibility of most fauna groups, so some of the differences reported below reflect this change in survey timing as well as any change on the ground. Where a specific driver is known, such as a dam drying up between surveys, it is identified below.

HABITAT TYPES REFERRED TO IN THIS SECTION

- Natural forest: the project's existing native forest, used throughout as the reference habitat against which planted areas are compared.
- Project area (the surveyed sections of newly planted land, including the northern survey area): planted with a mix of species, including the fast-growing pioneer species Ceiba pentandra. Ceiba is planted deliberately to establish canopy cover quickly; the intention is for this cover to create the shaded conditions needed for native species to regenerate naturally underneath it over time, not to remain a Ceiba stand permanently.
- Eucalyptus plantation: an existing plantation established in 2012, before the project began, on non-project land within the wider APSD concession. It is not a project intervention. It is included in this monitoring as a comparison point, showing what biodiversity outcomes look like on land planted with a single fast-growing species rather than the native-species mix the project itself is planting.

KEY METRICS

Group	2024 baseline	2025–2026 monitoring	Change
Amphibians (species)	12	20	+8 (+67%)
Amphibians (individuals)	425	1,135	+167%
Bats (species)	7	16	+9 (+129%)
Bats (individuals)	95	127	+34%
Birds (species)	132	157	+25 (+19%)
Birds (individuals)	1,687	1,058	−629 (−37%)
Dragonflies (species)	37	26	−11 (−30%, not statistically significant)
Dragonflies (individuals)	498	1,433	+935 (+188%)
Mammals (species)	19	15	−4 (−21%, not statistically significant)
Mammals (individuals)	158	186	+28 (+18%)
Crocodile encounters (all dams)	350	256	−94 (−27%, not statistically significant)
Crocodile hatchlings (share of total)	26%	40%	+14 percentage points



Observers searching leaf litter for frogs within a mature plantation.

DRAGONFLIES



Dragonflies show a large rise in total individuals counted (+188%), alongside the only case of species richness falling (37 to 26). Neither change is statistically significant, but the assemblage composition did shift significantly between the two surveys. Dam habitats remain the stronghold for this group, accounting for 96% of individuals recorded.

FLORA AND FOREST STRUCTURE



1. Survey undertaken for APSD prior to the planting of the Eucalyptus

Flora monitoring recorded 264 plant species in 2024, up from 114 in a 2011 historical survey (1.). A comparable flora count has not yet been repeated for 2025–2026.

At the vegetation-layer level, 2025–2026 data shows a consistent pattern. Tree-layer diversity is highest in the natural forest (7 species, Shannon $H' = 1.74$) and lowest in the Eucalyptus plantation (2 species, $H' = 0.25$), while the project area sits in between (5 species, $H' = 1.35$).

Large native trees are present in both the project area and the natural forest, but their seedlings are largely absent. Of the native focal species tracked across the whole area (the Eucalyptus plantation is excluded from this count), seedlings of Rosewood, Mahogany, Papao and Ofram, were absent from every plot surveyed. Only three species showed any seedlings at all, Hyedua and Dawa Dawa each had a single seedling in the project area, and Shea had a small number in both the project area and the natural forest. Why the seedlings are missing is not yet established. Probable factors include fire, browsing, weed competition, seed dormancy, seed predation by insects or animals. Section 4 sets out the recommended response.

The project area currently shows a high proportion of Ceiba pentandra, a fast-growing pioneer species planted deliberately to establish canopy cover for the native species intended to follow. This reflects planting decisions from earlier years; the 2025–2026 planting season has already shifted the mix substantially, with Ceiba now making up less than 10% of what was planted.

MAMMALS: MORE INDIVIDUALS, FEWER SPECIES

Total individuals recorded rose in 2025–2026, driven mainly by increases in Patas Monkey and Bushbuck.

The mammal species list was shorter than in 2024 (15 species against 19), with no new species recorded, though the decline is not statistically significant.











CROCODILES: A SEASONAL PATTERN, NOT A DECLINE

Seasonal water availability explains the 27% drop in crocodile encounters. The 2024 baseline survey was conducted in the wet season; the 2025–2026 monitoring survey was conducted in the dry season, after one of the six dams (Dam 2) had dried up completely (–100%).

This points to crocodiles redistributing toward remaining water. The rise in hatchling numbers over the same period is consistent with a healthy, breeding population responding to seasonal water availability.

The team leader examining a juvenile West African crocodile (Crocodylus suchus) at Dam 3.

BIRDS: MORE SPECIES, FEWER INDIVIDUALS

Species richness rose in every habitat type in 2025, even as each recorded fewer individual birds than in 2024, a landscape-wide pattern. The steepest fall in numbers was in the planted areas, alongside the only evidence of aerial bird traps. Seven Palearctic migrant species were recorded in 2025–2026, showing the area also functions as a migratory stopover.

The cause of the abundance decline is not yet known. It may reflect habitat change, rainfall, or differences in detection between the two survey rounds.



FIRST SOIL BIODIVERSITY BASELINE



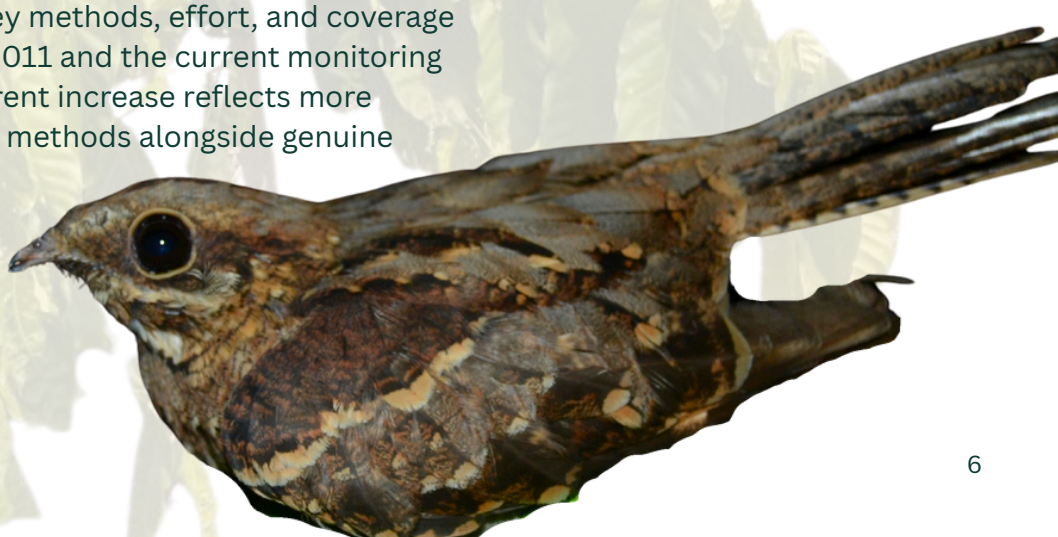
This monitoring round also delivered the first baseline study of soil biota, covering soil animals and soil microbial communities, with 127 soil-animal species recorded (2,350 individuals, ants the most predominant group) and physical and chemical soil properties assessed across land-use types.

LONGER-TERM CONTEXT

Older historical surveys show an even bigger recovery than the 2024 baseline comparison does.

Birds have risen from 41 species in a 2011 survey (1.) to 157 today, an increase of 283%, and flora from 114 species in 2011 to 264 in 2024, an increase of 132%. Survey methods, effort, and coverage differed substantially between 2011 and the current monitoring programme, so part of the apparent increase reflects more thorough and systematic survey methods alongside genuine ecological change.

1. Survey undertaken for APSD prior to the planting of the Eucalyptus



3. KEY SPECIES AND HABITAT



Conservation value rests on more than species counts. Two findings in particular stand out as being of national or international significance, alongside a wider set of species that carry formal conservation status.

A POSSIBLE NEW BAT SPECIES TO SCIENCE



A mist net deployed in a young plantation during bat surveys.

A single long-eared bat captured during the 2025 fieldwork could not be matched to any species previously recorded in West Africa. Its genus, Laephotis, had only ever been recorded in eastern and southern Africa. Genetic analysis places it as a distinct lineage close to a southern African species, but different enough that it may prove to be new to science.

Confirming this will need further genetic and acoustic work. The finding already extends the known range of an entire bat genus by thousands of kilometres, and it was made in the northern section of the project area, showing that well-managed restoration land can support globally significant discoveries as well as intact natural forest.

The report names this area a priority habitat for protection on that basis.

> ***The Atebubu FLR project has shown early promise for biodiversity, and we have made recommendations to support the restoration transition. Monitoring has recorded a bat of the genus Laephotis, the first record of the long-eared group (Laephotis s. str.) in West Africa. KNUST welcomes the opportunity to be closely involved with this project and looks forward to longer-term engagement and ongoing monitoring.***
>
> **Dr Laurence Brobbey, KNUST, lead author of the biodiversity monitoring report**



A NATIONALLY IMPORTANT CROCODILE POPULATION

The dam network supports what the researchers describe as one of the most significant known populations of the West African crocodile (Crocodylus suchus) in Ghana. A five-night survey recorded 256 crocodiles, with Dam 3 alone accounting for just over half of all sightings. Nearly 40% of individuals recorded were hatchlings, indicating active, successful breeding.

The researchers note that this species may in time warrant a higher conservation status than its current "Least Concern" listing, given how depleted crocodile populations have become elsewhere in West Africa. This makes the population disproportionately important.

OTHER SPECIES OF CONSERVATION CONCERN

Species	Status	Note
Patas Monkey (Erythrocebus patas)	Near Threatened; Ghana Schedule 1	Increased from 4 to 22 individuals (+450%) since 2024
Straw-Coloured Fruit Bat (Eidolon helvum)	Near Threatened	Detected via environmental DNA; a key seed-disperser for West African forests
Hooded Vulture (Necrosyrtes monachus)	Critically Endangered	Recorded once in 2024; not observed in 2025–2026, so continued presence is uncertain
Demidoff's Galago (Galagoides demidoff)	Least Concern; CITES Appendix II	8 individuals recorded
West African Slender-snouted Crocodile (Mecistops cataphractus)	Critically Endangered	Suspected at Dam 4 since the 2024 baseline; not confirmed by 2025–2026 monitoring or eDNA
West African Dwarf Crocodile (Osteolaemus sp.)	Vulnerable	Suspected at Dam 4 since the 2024 baseline; not confirmed by 2025–2026 monitoring or eDNA
Rosewood (Pterocarpus erinaceus)	Endangered	Trees present in project area and natural forest; no seedlings recorded in any plot surveyed
African Mahogany, Afzelia (Khaya senegalensis, Afzelia africana)	Vulnerable	Mature trees present; no seedlings recorded in any plot surveyed
Shea (Vitellaria paradoxa)	Vulnerable	The only focal tree species with seedlings recorded at more than one location
Limba (Terminalia superba)	Near Threatened	Present in mixed plantation only; seedlings absent from every plot surveyed

KEY HABITATS

- Natural forest consistently supports the highest species richness across amphibians, birds, and mammals. It is also the only habitat where tree-layer diversity increases in the younger growth stages beneath it, instead of narrowing as it does elsewhere. .
- The dam network is the stronghold for dragonflies (96% of all individuals recorded) as well as for crocodiles, and eDNA sampling suggests it is also used by the Near Threatened straw-coloured fruit bat for drinking.
- The northern project area recorded the highest bat diversity of any habitat monitored, including the Laephotis discovery, showing that young restoration plantings already carry real conservation value.
- Agroforestry land bordering the concession consistently shows the lowest biodiversity across every taxonomic group monitored, though frog diversity there is improving as tree cover on farms matures.
- New dams forming in the north of the concession, as the new planting around them matures, represent a future opportunity to extend crocodile habitat beyond the core southern population (see Section 4).

4. RECOMMENDATIONS FOR MANAGEMENT

The project is actively working through the recommendations below with APSD and the research team. This section reflects work already underway.

FLORA: PROJECT AREA AND NATURAL FOREST



- Investigate the specific causes of low seedling establishment, including seed dormancy, seed predation, and browsing pressure, to target future management more precisely.
- Adopt ring weeding around planted seedlings in place of clearing the full herb layer, and train workers to identify the seedlings of native focal species so they can be left in place during routine maintenance, as a precaution regardless of the underlying cause.
- Continue the shift already made in the 2025–2026 planting season, where Ceiba pentandra fell to under 10% of new planting with native focal species making up the rest, in future planting cycles.
- Increase general maintenance of planted areas to improve seedling survival rates.
- In the natural forest, reduce grass competition and wildfire pressure at the seedling germination stage, and implement enrichment planting of focal species to support their regeneration.

DRAGONFLIES



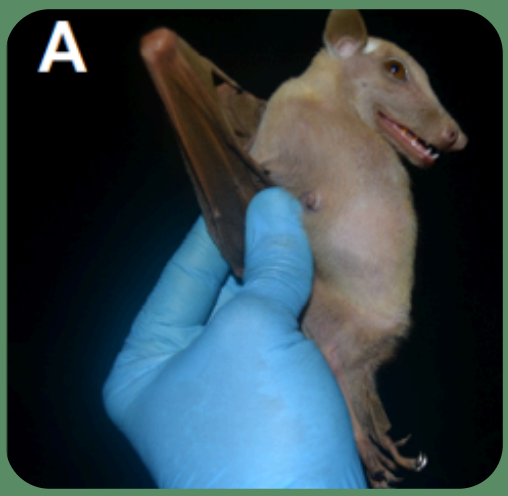
- Protect the high-abundance dam habitats while maintaining river and stream habitats as complementary components of the wider aquatic network, including water quality, riparian vegetation, and hydrological connectivity between them.
- Reduce sediment input and vegetation clearing around occupied water bodies, and minimise disturbance around dams, streams, and the river.

AMPHIBIANS



- Maintain the mosaic of natural vegetation, new planting, and agroforestry habitats, since each supports a distinct amphibian assemblage, and retain permanent and temporary ponds within modified landscapes.
- Schedule any activities that disturb water bodies, such as dam construction or dredging, during the dry season to avoid disrupting breeding.

BATS



- Maintain the mosaic of habitat types, since no single habitat supports the full bat assemblage, and avoid clearing all understorey vegetation in new planting areas, maintaining water bodies and fruit-bearing trees there to sustain diversity as the project matures.
- Protect the new planting areas in the north and adjacent natural areas as a priority, given they hold both the highest bat diversity and the Laephotis discovery.
- Promote insectivorous bat populations as a component of integrated pest management, given the rise in insectivorous bat activity recorded in newly planted areas.

BIRDS



- Enforce wildlife regulations in response to the aerial bird traps observed, and investigate the cause of the abundance decline recorded across all habitats.
- Protect water bodies and riparian zones used by the Palearctic migrant species.
- Reduce agrochemical use and retain native vegetation within agroforestry farms, which currently support the lowest bird diversity and abundance.

MAMMALS



- Prioritise protection of remnant natural vegetation patches, particularly those near water and riparian zones, which are the only habitat where all recorded species were found.
- Retain understorey vegetation, maintain water bodies, and reduce disturbance to further improve habitat quality.
- In agroforestry, increase shade-tree cover, reduce pesticide use, reduce hunting pressure, and retain native vegetation patches within farms to improve habitat quality, which is currently the lowest for this group.
- Strengthen anti-poaching patrols and Schedule 1 enforcement, particularly for the Patas Monkey given hunting pressure remains a significant threat to mammal populations.

CROCODILES



- Treat Dam 3 and its surrounding water body as a core conservation zone, given it holds just over half of all crocodile encounters recorded, and maintain water levels across the dam network where feasible, including riparian vegetation retention, given dams like Dam 2 are prone to drying out completely.
- Manage the new dams created in the north of the concession to hold water year-round as the trees there mature, so they can be colonised naturally from the core southern population and ease pressure on Dam 3.
- Maintain connectivity and riparian corridors between dams to support movement and gene flow between sub-populations, and manage roads adjacent to water bodies (for example with speed controls) to reduce road mortality, particularly in the wet season when hatchlings are most active.
- Run targeted dry-season surveys with species-specific eDNA at Dam 4 to resolve the status of two suspected but unconfirmed species there, the Critically Endangered slender-snouted crocodile and the Vulnerable dwarf crocodile.

5. RECOMMENDATIONS FOR ONGOING MONITORING

Two years of comparable data are not enough to say whether these trends come from restoration or from natural year-to-year variation. Five consecutive years of consistent monitoring will make that distinction possible. The following priorities carry forward into the next monitoring cycle.

- Continue annual wet- and dry-season surveys across all core taxonomic groups to build toward that five-year comparison baseline.
- Standardise the timing of future surveys, including the time of year and time of day, since both affect the activity and detectability of most fauna groups and currently limit direct comparison between survey rounds.
- Expand acoustic monitoring for bats and birds, already being explored by project students, alongside existing mist-netting and point-count methods, to standardise detection and improve confirmation of the possible new Laephotis species.
- Use eDNA sampling as an extended baseline tool, applied to each new planting area as it is established, to record presence and absence there. Extend this sampling to sediment and terrestrial samples, and develop species-specific assays targeted at the two crocodile species suspected but not yet confirmed at Dam 4.
- Repeat the soil biota survey annually to build a trend line from this cycle's first baseline, treating it as a core monitoring indicator going forward.
- Maintain and, where possible, strengthen anti-poaching patrols and follow-up enforcement on aerial bird trapping.
- Establish farmer-based biodiversity checklists and strengthen participation from APSD and iNovaland staff in routine monitoring, to broaden data collection beyond the annual survey visits.
- Review the monitoring framework periodically to reflect updated international best practice and align with Global Biodiversity Framework targets.
- Protect the three habitats the report names as monitoring priorities, Dam 3 (crocodile core habitat), the northern planting area (Laephotis habitat), and remnant natural vegetation patches, and track outcomes at each specifically in the next report.



A researcher handling a captured bat during a night survey.



The night survey team preparing to search for frogs.

6. CONCLUSION

Two years of data are not enough to prove that restoration is driving the changes recorded here. The same two years do show what continued management is holding back.

The natural forest's grass layer is shaped by recurring wildfire and grazing pressure, both of which suppress tree seedlings. The project already works with surrounding communities on this, and has trained more than 140 fire volunteers in partnership with the Ghana National Fire Service. The Eucalyptus plantation faces ongoing pressure from the invasive weed Chromolaena odorata, identified in the report as a significant constraint on future regeneration there, and management is reviewing options to bring it under control. Evidence of aerial bird traps and hunting pressure on mammals show that poaching remains a threat, one the project is addressing through the anti-poaching patrols and follow-up enforcement set out in the recommendations above.

Set against those pressures, this landscape currently holds one of the most significant known populations of the West African crocodile in Ghana, breeding successfully at Dam 3, and a bat species that may be new to science, found in an actively managed area of new tree planting instead of untouched forest. Continued protection is what stands between the pressures described above and the loss of both.

> ***Restoration only works as a full package. It has to hold biodiversity, community, and carbon together, because that's the only version of it that actually benefits people and nature at the same time. As iNovaland, we're looking forward to even bigger impact as the trees grow and that impact becomes even more visible across the landscape and the ecosystem.***
>
> **Andrew Heald, Chairman, iNovaland Group**

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